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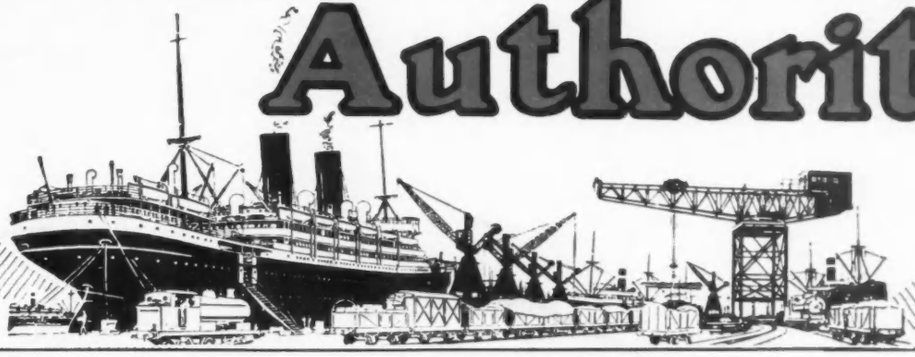

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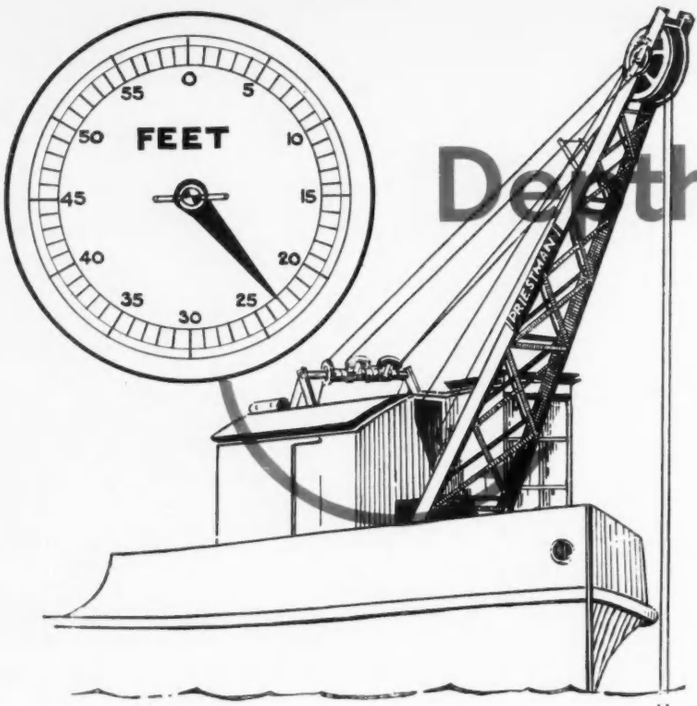

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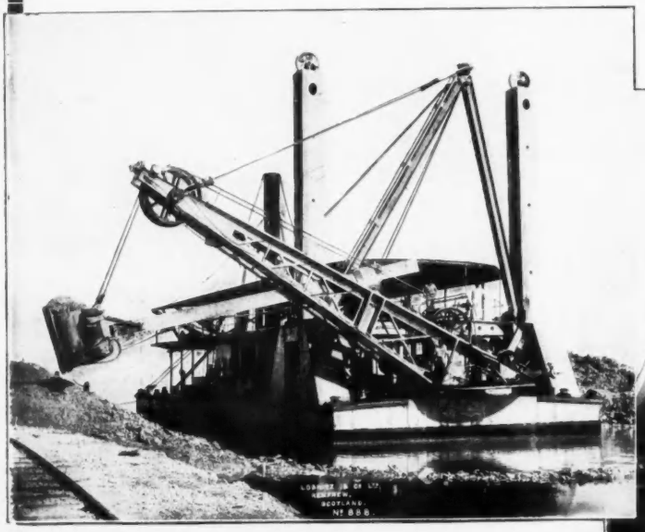

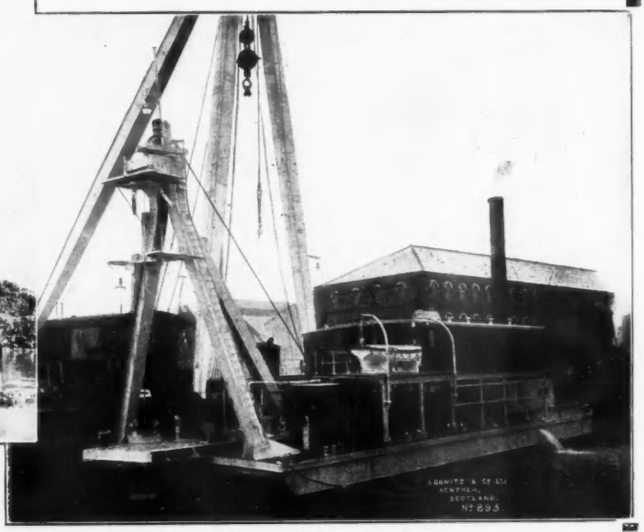

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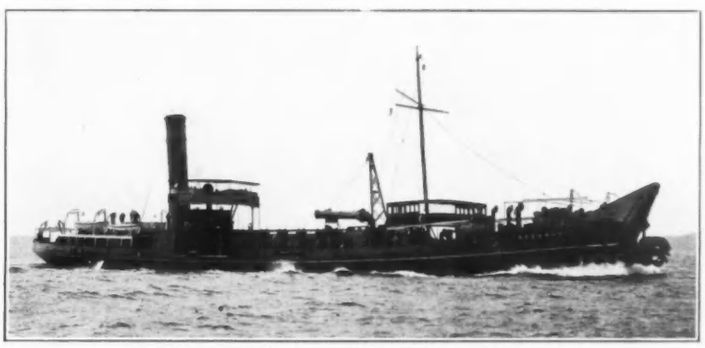

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The Dock & Harbour Authority

CONTENTS.

EDITORIAL	175
BOOK REVIEW	176
NEWS FROM ALL QUARTERS	177
ADEN PORT TRUST	178
IRISH HARBOUR MATTERS	179
PORT OF SOUTHAMPTON TOPICS	181
NOTES FROM THE NORTH	182
THE HARBOURS OF AUCKLAND, NEW ZEALAND	184
GRAB DREDGER FOR THE RIVER TRENT	193
HULL AND THE EAST COAST	194
PORT OF LONDON NOTES	194
PORT OF ALGIERS: THE MUSTAPHA JETTY—III.	195
NORTH-EAST COAST NOTES	202
THE PORT OF AMSTERDAM	202

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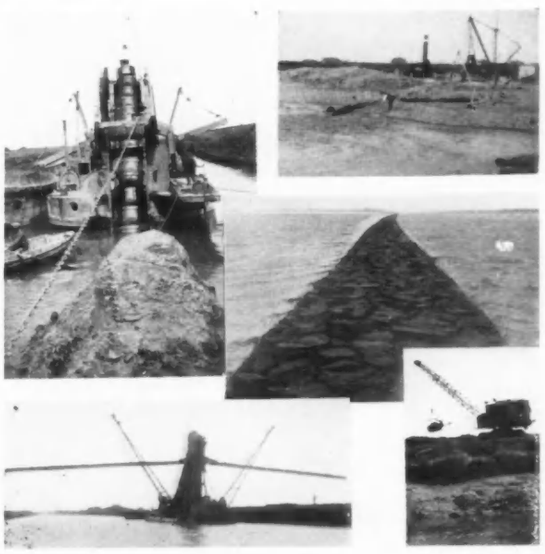

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THE DOCK & HARBOUR AUTHORITY

No. 187. Vol. XVI. MAY, 1936

Editorial

Tyne Dock to Change Hands.

Although at the time of writing there was no official confirmation, there seems no reason to doubt that the scheme for the acquisition of the London and North-Eastern Railway Company's Tyne Dock by the Tyne Improvement Commission will shortly be an accomplished fact. The negotiations between the parties have been very protracted and some months ago when the Tyne Improvement Commission made an offer to the London and North-Eastern Railway Company of £450,000 for the dock, it was promptly declined, and the Railway Company then withdrew their offer to sell the dock for £650,000, a complete deadlock ensuing. Now, however, it is stated on reliable authority that the negotiations between the two bodies have been virtually concluded. The position is, it is understood, that complete agreement has been arrived at between the contracting parties at a price of about £600,000. It is still necessary, however, to secure Parliamentary assent, which will probably be obtained by an additional clause to a Bill already before Parliament.

Despite the failure of all attempts to obtain official confirmation that the deal is actually concluded, substantial corroboration of the matter is contained in a statement issued by the London and North-Eastern Railway Company in the second week in April. The statement was this: "It is correct that negotiations are proceeding for the transfer for part of the Tyne Dock Estate of the London and North-Eastern Railway, but these negotiations are of a confidential nature, and have not yet reached a stage when a statement can be issued to the public. The River Tyne Commission have approached the Company because they have in view schemes for building deep water quays in the vicinity of the Tyne Dock Estate. These cannot be carried out without a suitable arrangement being made with the railway company.

"Many considerations of an important nature are involved and it will be impossible for the scheme to proceed without Parliamentary sanction. No time is being lost in carrying on the negotiations and in the event of these being brought to a successful conclusion it will be possible to announce details of the proposed transfer of the ownership of the dock to the Tyne Improvement Commission. In the meantime as the matter is *sub judice* it is impossible to give any more detailed information."

The scheme provides for a 1,400 ft. quay on the North side of Tyne Dock, with berthing accommodation for vessels up to 30,000 tons. The river would be dredged to give a depth of 35 ft. at low water, and it has been estimated that the work would mean the employment of between 400 and 500 men for two years. The whole scheme, it is expected, would take about three years to complete and the cost would be in the region of £750,000, of which, it is understood, the Special Areas Commissioner is willing to provide one-third. This deep water quay is an alternative to the more ambitious Jarrow Slake scheme, which did not find Government approval. Tyne Dock has a water area of 50 acres with a quay frontage of 11,000 ft. It is the largest dock on theTyne.

Whitehaven Dock Improvement Scheme Abandoned.

Whitehaven Harbour Commissioners have abandoned the scheme for altering the dock entrance to enable larger vessels to enter the port. This decision was reached so as not to retard the coal shipping operations of a new company which is being formed to reopen the Whitehaven mines. Towards the scheme, which was estimated to cost over £25,000 and would provide work for a large number of men for about six months, Mr. Malcolm Stewart, Commissioner for Special Areas, had promised a grant of one-third of the cost and a loan for two-thirds.

The "Queen Mary" at Southampton.

The outstanding event in recent weeks has been the arrival of the "Queen Mary" at Southampton and her successful docking in the King George V. Graving Dock. The vessel arrived at Southampton on Friday, March 27th, entered the graving dock in the afternoon, and the operation of pumping out the water occupied a period of 5 hours and 4 minutes with only two of the four main pumps working. The docking of this huge vessel was carried out without a hitch.

The King George V. Graving Dock, which was opened in July, 1933, was constructed principally for the purpose of accommodating the "Queen Mary," and its dimensions are: length 1,200 ft., width at entrance (and between buttresses) 135 ft., depth from cope to floor of dock 59 ft., and depth of water over keel blocks at high water neap tides 45 ft. The dock when full holds 78 million gallons of water, which can be pumped out in a matter of 4 hours with three of the four pumps working. Although this dock was built primarily to accommodate the "Queen Mary," it can also accommodate vessels up to 100,000 tons, if any should be constructed.

The "Queen Mary" was laid down in December, 1930, but owing to the slump, work was suspended upon her in December, 1931, and resumed again in April, 1934. She was launched in September, 1934, and commences her maiden voyage from Southampton to New York on May 27th. The principal dimensions of the "Queen Mary" are:—Length on water-line 1,004 ft., beam 110 ft., height (keel to top superstructure) 135 ft., (keel to top forward funnel) 180 ft., (keel to mast-head) 234 ft.

Extension of St. Andrew's Dock, Hull.

Fuller particulars of the important scheme for the extension of the St. Andrew's Dock at Hull to cost approximately £750,000 are now available. The scheme which has been adopted with a view of giving greater facilities for the Hull fishing industry and of avoiding congestion provides for an extension of the dock westward by 1,250 feet and an increase in the water area of 5½ acres, bringing the total water space up to 25 acres. In addition to the extra berthing facilities thus provided, there will be a new quay 1,000 feet long and 90 feet wide at which trawlers will be able to land and market their catches. The lay-out of this quay will be such that it can be extended by a further 250 feet if and when required. The existing slipways will be removed and reconstructed at the western end of the extension and increased from four to five. Two syphon pipes will ensure the draining, and the deepening of the extension dock to 30 feet will bring the entire dock to a uniform depth. It is also proposed to make the entrance from St. Andrew's Dock to the extension dock the same width as the main entrance from the river and to lengthen and widen the bridge over the entrance to the extension dock. Two 5-ton coaling cranes of the box type will be provided on the south side of the extension for the bunkering of trawlers and equipment for repairs will also be installed. The improvements will necessitate a rearrangement of the railway lines and of the signalling lay-out. When the detailed particulars are approved by the London & North Eastern directors, it is expected that the work will be put in hand forthwith.

Manchester Ship Canal Traffic.

The approximate monthly traffic receipts of the Manchester Ship Canal Company for the month of March, 1936, amounted to £97,392, this being an increase of £5,737 over the adjusted figures for March, 1935, which were £91,655. The total for the first quarter of 1936 is £295,268, this being an increase of £20,515 over the adjusted figures for the corresponding period of 1935.

Book Review

RAVAGES OF THE SEA: ATTACK ON TIMBER, METAL AND CONCRETE.

(Summary of the 15th Report of the Committee of the Institution of Civil Engineers on the Deterioration of Structures of Timber, Metal and Concrete exposed to the Action of Sea-Water: issued on behalf of the Committee by the Department of Scientific and Industrial Research). Published by H.M. Stationery Office. 12s. 6d. net.

THE results of nineteen years' research on the ravages of sea-water on timber, metal and concrete are surveyed in a report published recently by H.M. Stationery Office. This is the 15th Report of the Committee of the Institution of Civil Engineers on the Deterioration of Structures in Sea-Water. In the course of the work hundreds of specimens of various materials have been exposed to the action of sea-air and sea-water at home, in the tropics, and at ports elsewhere in the Empire. In the first instance, the necessary funds were provided by the Department of Scientific and Industrial Research, but latterly the work has been carried on as a result of generous contributions from a large number of dock and harbour authorities, both at home and in other parts of the Empire.

TIMBER.

Damage to timber in sea-water, the report points out, is mainly caused by ship-worms, known to the scientist as *Teredo*. These are molluscs, but differ from mussels and oysters in having only a small part of the front portion of their soft bodies covered by shell. Using their shells as chisels, they excavate burrows in the wood, taking the sawdust produced into their bodies. Incidentally, ship-worms proved disastrous on the fourth voyage of Columbus, whose ships were " pierced with worm-holes like a beehive." Impregnating the timber with poisons has been found to be the most satisfactory method of dealing with their attack.

The most efficient poison has been found to be the arsenical compound known as " D.M." (chloro-dihydro phensarsine), which was used as a poison gas during the war. The best method of impregnation appears to be to dissolve the poison in creosote and to force it into the timber by an ordinary Bethell process, in which the timber is first placed in a vacuum and the liquid then forced in under pressure. " Incising " the timber with knives before cerosoting greatly increases the uniformity of penetration.

Timber specimens were first exposed at Lowestoft, but here the slight attack inside the harbour and the losses of specimens through storms outside led to the experiments being abandoned in favour of Plymouth. It was generally found, however, that the attack by *Teredo* was erratic in home waters, and to get results more quickly, treated specimens were sent for exposure to Colombo, Singapore, Brisbane, Auckland and Wellington (New Zealand), Takoradi, Kingston and Bermuda. To attract the borers and to encourage them to attack the test specimens, " appetisers " in the form of pieces of untreated wood were attached to the faces of the specimens.

The creosote itself was found to act to some extent as a poison, and it was even found in some places that creosote containing less than 0.1 per cent. of " D.M." was sometimes less protective than creosote alone, while the addition of even 5 per cent. of " D.M." did not always add definitely to its efficiency.

Another creature which in some situations, the report states, causes even more damage than *Teredo*, is *Limnoria*. These animals, which are allied to shrimps and lobsters, are minute compared with the mollusc borers. They work on the surface of the wood, and Professor Barger states in the report that really no effective protection against them has yet been revealed by the Committee's experiments, though good creosoting seems to repel them to some extent.

The report refers to the examination of some forty-year-old piles at Southampton, where an outer creosoted shell had remained immune, but the inner portion had partly disappeared, owing to severe attack by *Limnoria*. Investigation showed that many of the volatile constituents of the creosote were absent, and Professor Barger suggests that these have either been extracted by sea-water in the course of years, or the creosote employed at that time differed considerably from that used to-day. On the other hand, he suggests that it may be " that the really toxic constituents of creosote are complicated hydrocarbons of the type now known to produce cancer."

CORROSION OF IRON AND STEEL.

In the tests on the corrosion of iron and steel described in the report, specimen bars of fourteen different materials were used. The test specimens were, in general, 24 ins. long by 3 ins. by ½ in. They were despatched for testing to Auckland, New Zealand, Colombo, Halifax, Nova Scotia and Plymouth. Here they were divided into groups and exposed to atmospheric conditions above the level of high water, also to half-tide and totally submerged conditions, for five and ten years. At Plymouth sets of bars were also exposed to fresh-water conditions. The Committee was advised throughout by Sir Robert Hadfield. After exposure, the specimens were sent to Dr. J. Newton Friend for examination and report.

Considerable variation was found in the extent and nature of the corrosion at the different observing stations. For example, in the half-tide tests and in the tests above high-water mark, the bars at the Colombo station were most severely attacked. Next in order were those at Plymouth and Halifax, while Auckland has suffered the least. As between the different bars, the irregularity in the extent of corrosion was found to be greatest with the bars exposed above high-water mark. The most corroded of the bars exposed above high-water mark lost 72.5 times as much in weight as the least corroded bars, while the corresponding figure for bars exposed at half-tide was only 6.1, and in complete immersion tests only 2.6. Except at Colombo, the completely immersed bars, the report states, lost more heavily in weight than those exposed at the half-tide level. Thus the popular idea that corrosion is most severe under half-tide conditions is not always in accordance with the facts.

The investigations show that, on the whole, there is little to choose between wrought iron and mild carbon steels, both being cleaned from scale. With regard to carbon steels exposed with the scale on, those high in sulphur and phosphorus proved the least satisfactory. The addition of small percentages of copper was shown to be of some benefit. The addition of chromium appeared beneficial in the tests above high-water mark, but in the half-tide and complete immersion tests it resulted in excessive pitting. The best results were obtained by adding a proportion of nickel to the steel, an addition of 36 per cent. rendering the steel exceptionally resistant under all conditions. Cast irons resisted aerial corrosion well, but in the half-tide and complete immersion tests corrosion was found beneath the surface.

THE PAINTING OF IRON AND STEEL.

The report discusses the protection of iron and steel by means of paint and other preservatives.

The tests were made on mild steel plates coated with the different preservatives to be tested, and exposed at Southampton to aerial, half-tide, and complete immersion conditions. Further plates were exposed, to half-tide conditions only, at Weston-super-Mare. Red oxide paint was adopted as a standard for comparison. In addition to ordinary paint, a number of plates were galvanised, and others were coated with tar and bituminous mixtures. Good results were obtained by applying hot tar to cold plates, and it was found that coloured paints could be satisfactorily applied on the top of tar if shellac varnish was first interposed.

The report states that it is desirable to remove all scale before application of paint. This may be accomplished by sand-blasting, pickling or some other method. One important firm of bridge builders allow their structures to stand exposed to the weather, after erection, without any covering of paint, and when corrosion has proceeded sufficiently to loosen the scale, the rust and scale are scraped and the metal is given its first coat of paint. The Great Western Railway Company have reported in favour of this procedure.

In the tests above high-water mark and the complete immersion tests, additional coats of paint were found to have a beneficial result, but in the half-tide tests the opposite result was obtained.

DETERIORATION OF REINFORCED CONCRETE.

Owing to numerous reports of failures in reinforced concrete piles and structures exposed to sea action, the Committee decided to undertake a detailed investigation with a view to determining the cause of the failures and the steps that should be taken to prevent their recurrence.

In this section of their work the Committee has been assisted by Dr. R. E. Stradling, Director of Building Research in the Department of Scientific and Industrial Research. The experiments were planned with a view to testing the indications of previous work, namely, the preservation of reinforced concrete in sea-water by using a concrete mixture rich in cement of a rather dry consistency, and adding to the concrete, materials known as pozzolanas, consisting of volcanic dusts which occur naturally in various parts of Europe. Trass, a volcanic rock found in Germany, is an example. Such materials do not occur naturally in the British Isles, but recently, as a result of work at the Building Research Station, it has been found that artificial materials having similar properties can be produced from the spent shales of the Scottish oil industry, and from burnt clays.

In the course of the experiments, 474 reinforced concrete piles made of various concrete mixtures were exposed, some at the Building Research Station, Watford, and some at Sheerness, while some were forwarded to the Gold Coast for exposure under tropical conditions. At Watford the piles were exposed in tanks containing artificial sea-water of three times normal strength. These tanks were emptied at intervals to simulate the effect of the tide. The results given in the report cover examinations of the specimens over a period of five years, and experiments are being continued for a further period of five years, when a supplementary report will be issued.

Each section of the report is accompanied by very numerous tables, diagrams and photographs.

News from all Quarters

South Africa

IN the course of the Budget Speech delivered to Parliament by the Hon. the Minister of Railways and Harbours on the 26th March, 1936, Mr. Pirow said, *inter alia*:—

"In terms of the Nijhoff Commission's report, certain improved harbour facilities will have to be provided at Port Elizabeth, East London, and Durban. The Administration, while accepting Mr. Nijhoff's conclusions, has altered some of the details, especially as regards Durban. The position is fully explained in paragraphs 57-64 of the White Paper."

The paragraphs referred to by the Minister read:—

(57) At Port Elizabeth the Charl Malan quay wall has been completed over a distance of 2,950 ft., and four berths have been equipped with all shore facilities and are in regular use by shipping. It is anticipated that the fifth berth will be placed in commission in July, 1936, and the final unequipped section of the quay completed a month later.

(58) The quay wall on the Northern side is approaching completion, and the erection of the pre-cooling store is well under way. It is hoped that the work will be sufficiently advanced by August, 1936, to permit of ships being berthed at the quay and served from a position near the pre-cooling store and that the entire scheme will be brought to finality in July, 1937.

(59) When quays 1 and 2 are completed it will be possible to abolish the lighter system at Port Elizabeth.

(60) At East London 1,000 ft. of the quay have been completed and equipped with cranage and railway facilities and the erection of the combined pre-cooling store and cargo shed is approaching completion.

Dredging of the area whereon the remaining 500 ft. of the quay wall is to be erected is in progress.

(61) It is hoped that the combined pre-cooling store and cargo shed will be placed in commission by May, 1936. In the meantime use is being made of that section of the quay already built.

(62) The dredging of the additional manœuvring area in the turning basin and of the entrance channel, and the work of extending the south breakwater are proceeding.

(63) In the Capital and Betterment Estimates provision has been made for the construction at Durban of about 1,500 ft. of deep-water berthage beyond 'I' shed in the direction of Congella and the deepening of the Island View Channel from 30 to 35 ft.

(64) The latter work is considered in the nature of an improvement, while the former is regarded an essential requirement brought about by the increasing size and depth of the ships calling at the port and the growing volume of shipping traffic generally.

"Mr. Nijhoff's proposals as to harbour development at Capetown," continued Mr. Pirow, "although they contain valuable data and suggestions, have not been accepted by the Administration. We have decided to proceed along different lines, lines which will combine additional wharfage facilities with large scale reclamation work. The work at the 'Knuckle' is being pressed forward with great speed, and should be completed by February of next year.

"The pre-cooling store now being erected, should be in working order before the end of the year. It will be as large a pre-cooling plant as is to be found in any harbour in the world, and will serve the new 'Knuckle' berth, the adjoining berths 'B' and 'C' in the New Basin, and Nos. 3 and 4 berths on the South Arm in the Victoria Basin.

"Concurrently with the work at the 'Knuckle' and at the pre-cooling site, large scale dredging is going on in the New Basin, which, on the arrival of machinery which will shortly be ordered, will include rock-breaking at the south end of the basin.

"On the completion of the work in progress, one or more all-weather deep-water berths will be taken in hand on the southern side of the New Basin. The exact extent of these additional facilities cannot be accurately gauged at this stage. I think it is sufficient to say that block-making and other preparatory work will be taken in hand as soon as the machinery and the personnel are available and are not required at the 'Knuckle.'

"Thereafter, the further berthing accommodation will be provided by uninterrupted work until the Administration, after consultation with the Harbour Advisory Board, is satisfied that all reasonable requirements for some years have been anticipated. The time to be taken for the completion of the whole New Scheme, including all reclamation work, will depend on actual requirements.

"If shipping continues to favour Capetown, the date when the Mother City will have one of the most modern harbours in the world will not be so very distant. Conversely, if such sea-borne traffic falls off, the date will be postponed accordingly."

Mr. Pirow has agreed to meet a deputation from the Durban City Council in Capetown to discuss the restoration and protection of the Durban beach.

On the estimate of the eminent engineer, Mr. G. P. Nijhoff, this work will cost £175,000. Mr. Nijhoff's report also revealed that extensive harbour dredging had to an extent caused erosion, and on these grounds the City Council has based its claims for financial or mechanical assistance from the Government.

A minor scheme of beach restoration is now in progress on the north side of the beach, but the major scheme still to be tackled involves extensive sand pumping from the harbour entrance—work which requires the co-operation of the Railways and Harbours Administration.

Mr. S. J. Smith, Chairman of the Works Committee, and Mr. Walter M. Campbell, the city engineer, will form the deputation.

Canada

A report on the progress of the ports of Eastern Canada during 1935 states that passenger traffic on the Transatlantic route, using the Ports of Montreal, Quebec, St. John and Halifax, showed a small increase, 510 more passengers being carried than in 1934. The increase is due to the improvement in west-bound traffic; in east-bound traffic a slight decline was recorded.

In 1935, 1,017 overseas vessels with a tonnage of 3.96 million tons registered at Montreal, this being an increase of 33 vessels and 213,000 tons over the previous year. Coastal shipping, however, showed a decline on 1934, falling by 15 vessels and 70,000 tons.

Shipments of fruit from Montreal were 4.2 million bushels higher than in 1934. Wheat shipments, however, declined by 3.9 million bushels, while other grains registered a marked advance. Cattle exports declined in a remarkable fashion, only 523 head being shipped as compared with the 31,700 head of 1934. An increase in exports was recorded in the case of the following: Flour, apples and pears, cellulose and paper, hay, oil cakes, minerals, agricultural machines and parts, and timber. A decrease was recorded in the exports of cheese, eggs, melted fat and cement.

Imports of coal through Montreal declined by 128,000 tons on 1934, this being due to the considerable fall in the imports of soft coal and coke. Anthracite imports, however, showed an increase of 95,000 tons.

Raw oil, benzine, and refined oil imports increased by 89,000 tons. This was due to substantial increases in the raw oil and benzine categories, while import of refined oil declined.

The Port of Halifax reports that 1935 was a particularly good year. Saint John, however, experienced some decline in traffic.

In spite of further reductions in insurance rates for shipping visiting the Port of Churchill, on the Hudson Bay, the volume of shipping registering at this port last year was smaller than in 1934. The principal commodity shipped from Churchill is, of course, wheat. In 1935 only 2.4 million bushels were exported, as compared with well over four million bushels in 1934—a considerable decline.

Sweden

The company which controls the Stockholm Free Port reports that 1935 was busier than any preceding year. Goods unloaded totalled 262,288 tons, as against 285,227 tons in 1934, while exports showed a marked advance, rising from 31,207 tons to 42,769 tons. Heavy demands were placed upon the company's warehouse accommodation during the year, and in many cases it was found that the storage facilities available were hardly sufficient to meet the demand.

On May 1st new refrigerating chambers will be placed in service. These have become necessary owing to the greatly increased imports of fruit.

Norway

A new floating dock designed to take vessels up to 8,500 tons was recently taken into use at the Port of Bergen. The new dock is 600 ft. long and 100 ft. wide, and is built in sections with twenty water-tight chambers. Pumping is carried out by two pumps driven by two motors of 60 kw. each. A

News from all Quarters—continued

70-kw. generator plant is installed to provide power for the lighting of the docked vessel, and for the operation of four winches employed to haul the vessel into the dock.

The Lysverksstyret of Bergen has decided to purchase an extensive site of 1,600 Norwegian land units near Mathopen, the property of A/S Industri, for the development of an industrial port in this area.

Poland

The shipping statistics of Gdynia show an improvement in March, as compared with February. The number of seagoing vessels entering the port increased to 373 (February 327) with altogether 389,000 (343,000) n.r.t., while 360 (341) vessels with 372,000 (364,000) n.r.t. cleared the port.

The goods turnover of Gdynia in March totalled 584,000 tons, this being an increase of 55,000 tons on February. Imports rose by 28,000 tons to 96,000 tons, while exports advanced by 27,000 tons to 488,000 tons.

The position for the first three months of this year—as compared with the corresponding period of 1935 is as follows:—

	Imports		Exports	
	1936	1935	1936	1935
January	97,000	84,000	652,000	513,000
February ...	68,000	72,000	461,000	412,000
March	96,000	139,000	488,000	556,000
1st Quarter ...	261,000	295,000	1,601,000	1,481,000

The table reveals that the total goods turnover of Gdynia was substantially larger in January and February, and considerably smaller in March, than in the corresponding months of last year.

Belgium

The volume of seagoing shipping registering at the Port of Antwerp in March totalled 1,050 vessels of 2,054,323 tons, as compared with 866 vessels of 1,740,344 tons in the same month of 1935. In the first quarter of this year the volume of shipping visiting the port totalled 2,872 vessels, of 5,860,052 tons, as against 2,460 of 4,954,605 tons in the corresponding period of 1935.

Roumania

The Ports and Waterways Administration has borrowed 150 million Lei from the Industrial Credit Institute to promote the economic development of the Danubian ports of Braila and Galatz, and to finance improvements to the Black Sea Port of Constanza. Repayment of the loan will be made within 8 years, 6 per cent. interest being charged. It is understood that 75 million Lei will be allocated to the construction of a floating dock in the harbour of Constanza. The necessary machinery and equipment will be obtained from abroad, while the construction of the dock itself should be completed within a year. The remaining 75 million Lei will, in part, be devoted to the purchase of two large ice-breakers in order to keep the Danube open to shipping in the winter months, and thus prevent an interruption of the grain exports from Braila, and of the timber exports from Galatz, during the period when the river is frozen. The contract for both ice-breakers will be placed with a foreign shipbuilding firm. A commission of experts in consultation with the port authorities is to determine the type of vessel required—an ice-breaker of 1,500-2,000 h.p. with a tonnage of at least 720 tons is envisaged. The cost of the two ice-breakers is estimated at about 44 million Lei.

Aden Port Trust

The following are the returns of shipping using the Port of Aden for the month of February, 1936:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	128	558,426
,, ,, under 200 tons ...	3	486
Government Vessels	30	65,148
Dhows	121	5,112
PERIM.		
Merchant Vessels over 200 tons ...	5	5,746

The number of merchant vessels over 200 tons that used the port in February, 1936, was 128, as compared with 128 in the corresponding month last year, and the total tonnage was 558,000, as compared with 564,000.

Excluding coal, salt, fuel oil and Military and Naval Stores and transhipment cargo, the total tonnage of Imports in the month was 13,400 and of exports 8,000, as compared with 10,200 and 6,800 respectively for the corresponding month last year.

The total value of imports, excluding Government Stores, was Rs.63,54,000/-, as compared with Rs.46,89,000/- for February, 1935, and of exports Rs.37,99,000/-, as compared with Rs.31,28,000/-.

The total value of both imports and exports together was Rs.101,53,000/-, as compared with Rs.78,17,000/- for the corresponding month last year.

Imports during the month were above those for February, 1935, in the case of coffee, grain, pulse and flour, gums and resins, raw hides, seeds, grey piece-goods, twist and yarn, unmanufactured tobacco, and private treasure; and below, in the case of hardware, raw skins, sugar, white and printed or dyed piece-goods, and manufactured tobacco.

Exports were above those for February, 1935, in the case of coffee, grain, pulse and flour, gums and resins, hardware, raw hides, seeds, raw skins, grey and white piece-goods, twist and yarn, unmanufactured tobacco, and private treasure; and below, in the case of sugar, printed or dyed piece-goods, and manufactured tobacco.

TRADE OF THE PORT.

Article.	Unit	Imports		Exports	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal	Tons	15,773	3,24,297	0	0
Coffee	Cwts.	12,908	3,49,905	8,558	3,34,169
Grain, Pulse and Flour	,,	82,901	3,71,115	55,981	2,39,408
Gums and Resins	,,	6,022	83,969	1,617	37,604
Hardware	—	0	36,619	0	33,798
Hides, raw	No.	4,277	7,787	13,510	26,717
Oil, Fuel	Tons	57,148	13,28,699	0	0
,, Kerosene	Gls.	36,736	24,092	10,896	7,025
,, Petrol	,,	72,689	62,744	1,808	1,808
Salt	Tons	0	0	19,718	2,08,780
Seeds	Cwts.	7,315	60,245	1,059	7,887
Skins, raw	No.	352,879	2,15,321	549,846	4,85,244
Sugar	Cwts.	17,780	90,019	23,686	1,18,787
Textiles—					
Piece Goods, Grey	Yds.	5,373,822	7,32,785	4,082,980	5,15,875
,, ,, White	,,	532,684	89,981	555,224	91,227
,, ,, Printed or Dyed ...	,,	1,567,237	2,85,517	1,416,263	2,93,897
Twist and Yarn	Lbs.	323,600	1,35,530	282,984	1,18,136
Tobacco, Unmanufactured	,,	554,344	1,02,157	561,344	1,00,303
,, Manufactured	,,	58,324	56,909	21,280	17,153
Other Articles	No. of Pkges.	99,494	13,98,082	29,309	5,84,353
Treasure, Private	—	0	5,98,559	0	5,76,735
Total ...	—	—	63,54,332	—	37,98,906

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General Manager.

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Irish Harbour Matters

Dublin Port and Docks Board Accounts.

THE statement of accounts for the Dublin Port and Docks Board for the year 1935 shows a gross revenue of £240,401 8s. 5d., a total expenditure of £236,865 10s. 7d., and a surplus of £3,535 17s. 10d.

The receipts from tonnage dues and dues on goods amounted to £165,614 12s. 10d., being a decrease of £1,785 6s. as compared with the year 1934.

The Mortgage Bonds outstanding at the end of 1934, amounting to £200, were paid off out of Sinking Fund.

The loans outstanding at 31st December, 1935, amounted to £1,318,400 18s. 10d., the balance to the credit of the Sinking Fund at that date being £223,179 18s. 7d.

The register tonnage which entered the port during the years 1934 and 1935 was as follows:—

FOREIGN

	No. of Vessels	Reg. Tonnage
1934	904	1,006,832
1935	663	831,009
Decrease ...	241	175,823

CROSS CHANNEL AND COASTING

	No. of Vessels	Reg. Tonnage
1934	3,944	1,463,135
1935	4,851	1,738,273
Increase ...	907	275,138

Imports and Exports during the year 1935 were:—

IMPORTS

	Foreign Tons	Cross Channel Tons	Irish Coasting Tons
General Goods ...	728,304	441,131	12,369
Coal	70,808	973,941	—
	Loads	Loads	Loads
Timber (all kinds) ...	107,695	3,214	Nil

EXPORTS

	Foreign Tons	Cross Channel Tons	Irish Coasting Tons
General Goods ...	47,376	340,447	38,704
	Loads	Loads	Loads
Timber (all kinds) ...	530	3,385	824

Death of Mr. Walter Baird.

On 28th March last, the death took place of Mr. Walter Baird, manager of the Burns-Laird Lines, Ltd., Dublin. Mr. Baird was 71 years of age. In his native city of Londonderry, he entered the service of the Laird Line Company, and in 1902 settled in Dublin as their manager. In 1923, when the Burns and Laird Lines amalgamated, he was appointed as manager for the new company. Mr. Baird had been a member of the Dublin Port and Docks Board since 1904. He was vice-chairman of the Board in 1930, 1931 and 1932, and chairman in 1925 and 1933. He was senior member of the Board and was chairman of the Pilotage Committee since it was established under the Pilotage Confirmation Act 1926. He was vice-chairman of the Irish Tourist Association, and had completed ten years as chairman of the Finance Committee. Mr. Baird also was chairman of the Railway and Steampacket Golf Club and gave special attention to the work of attracting visitors to Ireland.

New £34,000 Pier at Foynes, Co. Limerick.

The new deep-water pier at Foynes, Co. Limerick, was formally opened by Mr. Sean Lemass, Minister for Industry and Commerce, on 23rd March last, when he also inspected the harbour extensions. Foynes lies some 22 miles below Limerick, or roughly a third of the distance between Limerick city and the spot where the Shannon empties into the Atlantic. It is the port to which Lord Derby's Commission of more than eighty years ago assigned a place of superiority over all Western naval stations in Ireland; and it has long been recognised as the outport for Limerick. In recent years this recognition has taken the form of extension and development and the port has become the oil distribution centre for a great part of the South-West of Ireland. Two of the largest oil and petrol companies operating in the Free State maintain extensive storage tanks alongside the harbour and overseas tankers of many thousands of tons discharge cargoes there every week.

In recent months, Foynes and its area have been invested with a new importance, for, on the report of technical experts sent by the British Government and Imperial Airways, a stretch of calm water due north-east of the village has been selected as the site for the experimental European terminal of the Transatlantic air service now being planned by Britain, the Irish Free State, Canada and the United States. It is expected that this development, when complete, will not only materially benefit Foynes, but Limerick, and indeed all the towns on the Shannon estuary.

Foynes Harbour, it might be said, has been designed by nature, but it was not until 1846 that the work of building the quays was undertaken. Under the Shannon Navigation Act the Board of Works, in the period 1846 to 1850, built the stone pier slip and breakwater at a cost of £10,000, of which the first Lord Monteagle gave £4,000. In 1852 and 1860 the basin was dredged, but it silted up again until only one berth was available. In 1890 the second Lord Monteagle obtained the Foynes Harbour Order, constituting the Trust, and the timber extension at a cost of £2,000 was then built, Lord Monteagle providing half the cost. This jetty was pulled down after forty-five years.

At that time the revenue was under £100 a year. In 1901 it had increased to £108, in 1910 to £251, in 1920 to £1,661, in 1930 to £5,000, and in 1935 to £5,676. In 1906 the British Petroleum Company came there, and they were followed twenty years later by the Irish-American Oil Company. Just before the Great War another extension to the pier was planned, but owing to the war the work was limited to the erection of a 150-ft. quay, which did not reach deep water.

The New Pier.

In 1931 it was recognised that the jetty could not last much longer, and plans were prepared for the present pier. Powers were obtained from the Dail in the shape of a Provisional Order and the construction of the work began in October, 1933. The work occupied twenty-seven months. The designers and engineers for the new pier were Messrs. Delap and Waller, of Dublin, and the engineers in charge were Mr. R. F. Waller and Mr. T. A. Simington. The contractors were Messrs. McCaffrey and O'Carroll, of Limerick.

While the harbour cannot take steamers of larger draught than before, the berth can be dredged to take larger vessels. The cost of the new work was £34,000. The trade at the port—which formerly had been used for the taking off of emigrants to America and as a refitting centre for British war vessels—consists principally of motor spirit, paraffin, coal, cement, timber and manures, the total tonnage in 1934-35 being 6,200 tons. The exports total 15,000 tons. The revenue for that year amounted to £5,675, and the largest vessel entering the port was the "Raila" of 8,770 tons.

Over sixty cylinders are used for supporting the concrete pier deck at Foynes. In constructing these cylinders a circular timber framework was first erected; jute was then wrapped round this "core," and alternate layers of jute and mortar then laid on, until a shell an inch and a half thick had been built up. As soon as this shell was dry the timber "core" was removed, and the cylinder was lifted by crane and placed in position in the river bed. All water within this shell—that is, within the cylinder walls—was then pumped out, and the cylinder filled with concrete to the top.

The construction of the deck itself is interesting on account of the absence of supporting beams. This was made possible by the use of a type or design of construction known as "the flat-slab system," which was used for the first time in Irish harbour work. This system, now very widespread in modern construction in the United States, has only recently been used in the British Isles. The reinforcement used in the deck slabs consisted of steel bars twisted together in pairs. As soon as the deck was complete railway sidings were laid down on the surface, and bollards of the bean type, lamp poles and other harbour equipment erected thereon. As the pier is in the form of a rectangle adjoining the land, freight trains and goods wagons and trucks can enter or leave from either "leg."

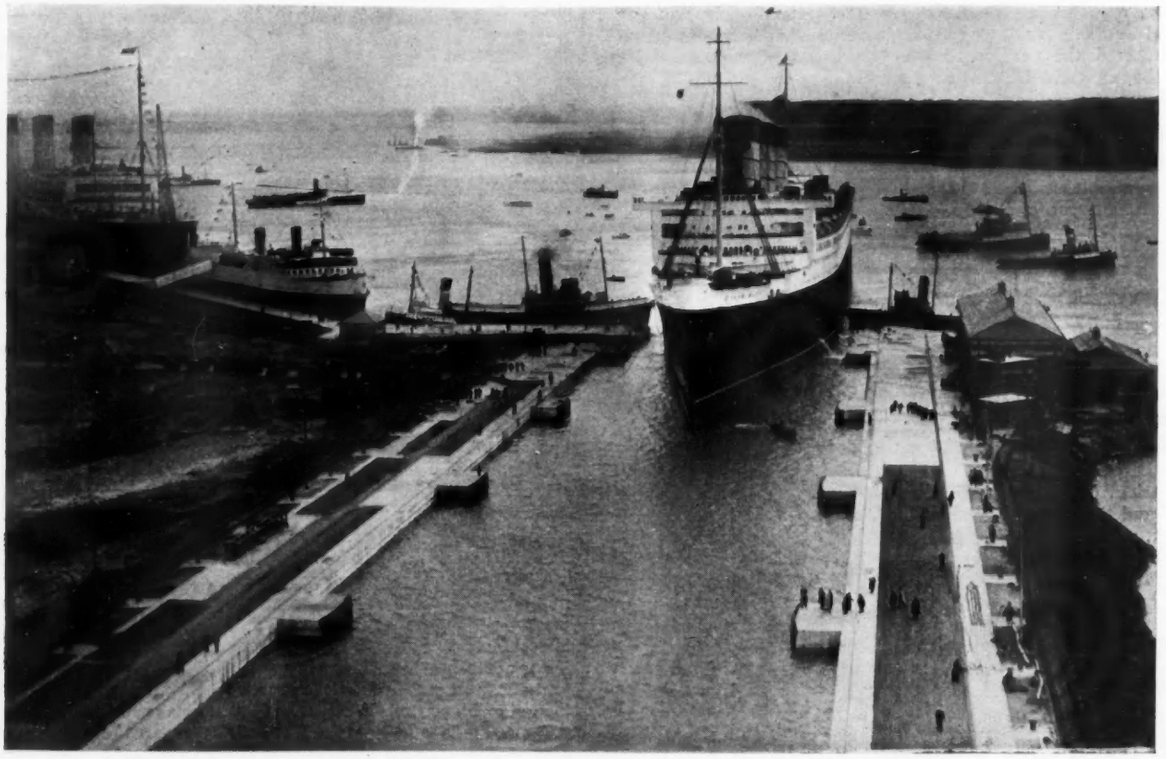
The new deepwater pier provides over two hundred yards of berthage for vessels at all times, and ships drawing up to twenty-six feet of water can lie afloat alongside even at the lowest spring tides.

In addition to serving Foynes and the adjacent area, the harbour is used to handle merchandise for many other places, including Newcastle West, Glin, Rathkeale, and, among others, Askeaton. Motor boats are available to make the passage to the Clare shore, and a service of motor barges operates between Foynes and Kilrush on the Clare shore of the Shannon. A floating pontoon is also available in the harbour.

The Cunard-White Star Liner "Queen Mary"

Photo] [Stewart Bale, Liverpool

The "Queen Mary" heading downstream after leaving the Builders' Yard at Clydebank.



The "Queen Mary" making her entry into the King George V. Graving Dock.

Port of Southampton Topics

Further Increases in Docks Statistics for March.

FOLLOWING the general increases recorded in all departments of Southampton Docks traffic in January and February comes another equally satisfactory return for March, making a quarter of considerable progress.

Not a single decrease has been recorded in respect of the number of ships and tonnage, cargo, and passengers since the beginning of the year, a record that probably no other port in the Kingdom can equal.

The full extent of the growth of the cargo traffic in the first quarter of the year is shown by the returns. Imports for the month rose from 47,505 tons in March, 1935, to 68,157 tons, and exports rose from 35,268 tons to 36,980 tons.

The advances for the first quarter of the year are:—

Imports	Tons Increase	Exports	Tons Increase
January	9,554	January	9,569
February	4,980	February	4,743
March	20,652	March	1,712
Total ...	35,186	Total ...	16,024

The total increase in the volume of cargo handled amounts, therefore, to 51,210 tons.

The number of vessels using the docks during March was much larger than that for March, 1935. Arrivals numbered 257, as compared with 212, and departures 254, as compared with 210. The respective increases were, therefore, 45 ships inward and 44 outward.

Gross tonnage inward rose from 1,222,520 tons to 1,432,973, an advance of 210,453 tons. The outward figure rose from 1,173,883 tons to 1,272,190 tons.

Net tonnage inward amounted to 783,449 tons, as against 652,111 in March, 1935, and outward the total was 700,114 tons, as compared with 638,732 tons. The respective increases were, therefore, 131,338 tons inward and 61,382 tons outward.

The passenger returns also showed a most gratifying increase. Arrivals numbered 12,356, compared with 10,067, and departures 10,542, compared with 9,019.

The increases in regard to this phase of port activity during the quarter were:—

Passengers Arriving	Increase	Passengers Departing	Increase
January	249	January	689
February	1,826	February	1,683
March	2,289	March	1,523
Total ...	4,364	Total ...	3,895

This gives a total increase in the number of passengers dealt with of 8,259.

Arrival of the "Queen Mary."

Southampton received the 80,000 tons "Queen Mary" with every confidence that she could easily be dealt with in the port. She was certainly considerably larger and longer than any liner which had previously negotiated the narrow waters to Southampton Docks. The French liner "Normandie," the only vessel comparable in size, has never yet been to a berth in the docks, preferring to anchor in Cowes Roads for the embarkation and disembarkation of passengers. But so carefully have the facilities at Southampton been developed by the Southern Railway Company and the Harbour Board that the great liner passed to and from the docks without the slightest hitch of any kind.

The deep-water approach channel, which is 1,000 ft. wide for a considerable part of its length, and has a depth of 35 ft. L.W.O.S.T., was quite adequate to furnish the "Queen Mary" with all the water she wanted. Indeed, her requirements in this respect are not so great as those of the "Majestic" and possibly the "Berengaria," which, with tonnages respectively of 56,000 and 52,000, draw more water than the "Queen Mary."

The "Majestic's" average draught when using the port in recent years has been about 39 ft., whereas the "Queen Mary's" draught when she set out for her trials—a fairer test than when she arrived light from the Clyde on March 27th—was 36 ft. forward and 37 ft. aft.

The manœuvring of the great ship was carried out with consummate ease, and her pilot, Captain George Bowyer, who has taken the "Berengaria," "Aquitania" and "Mauretania" in and out of the port on about 1,200 occasions, never had the slightest misapprehension.

It seems unlikely that the "Queen Mary" will use the new 7,000-ft. quay on the Western Shore to any appreciable extent. This view is supported by the fact that three special mooring bollards have been let into the middle of the quayside at berths 43 and 44, which the "Queen Mary" will use. These bollards are some 12 ft. or 14 ft. from the edge of the quay wall and have been so placed to reduce the angle of the moorings between ship and shore.

The "Queen Mary" in the King George V. Graving Dock.

In view of the fact that the "Queen Mary" will be using Ocean Dock extensively, opportunity has been taken to modernise the sheds at the berths mentioned, and a concrete floor is being laid down to replace the wooden floor in berth 44.

Upon her arrival from the builders, the "Queen Mary" went at once to the new King George V. Graving Dock, which was built at a cost of £1,850,000, and opened by the late King George in July, 1933. This basin, the largest in the world, provided ample room for the "Queen Mary," and having been designed to meet future requirements, will accommodate vessels of 100,000 tons should such be built.

Extra Service for Southampton.

Southampton's reputation for the rapid handling of perishable cargoes has enabled the Southern Railway to induce Mr. Jose Maria Condeminas, who annually charters ships for the carriage of Spanish produce to the United Kingdom to substitute Southampton for London as the port of discharge for such vessels.

This extra service of five vessels began towards the end of April, and will mean weekly calls.

It is anticipated that later in the year the same exporting firm will send further vessels to Southampton with Spanish soft fruits. This will probably be in June and July. It is also proposed to inaugurate a service for the conveyance of early salads. The service will operate to Hamburg, but the vessels will call at Southampton to discharge a part of their cargo.

Proof of the facilities at Southampton for cargo of this nature is shown by the phenomenal developments which have taken place in regard to the shipments of South African citrus and deciduous fruit, West Indian bananas and Jaffa citrus fruit. Millions of packages of such fruit is dealt with annually.

Notes from the North

Bromborough Dock.

AT the annual meeting of Lever Bros., Ltd., owners of Bromborough Dock, Mr. F. D'Arcy Cooper said Bromborough Dock was being used increasingly for shipment of their manufactures to various ports abroad and around the coast. It had been of great service also in keeping competitive charges down.

New Pilot Boat for Mersey Docks and Harbour Board.

Mersey Docks and Harbour Board has approved a recommendation of the Pilotage Committee to accept the tender of Messrs. Smith's Dock Company, Ltd., South Bank-on-Tees, for the construction of a single-screw steam pilot boat, 155 ft. long, 30 ft. beam, and 14 ft. 6 in. moulded depth, the vessel to be delivered at Liverpool within 36 weeks of the date of the acceptance of the tender.

Caernarvon Harbour Trust.

Caernarvon Harbour Trust has accepted the tender of Col. Llewelyn Lloyd Jones for inspecting and submitting a report on the Trust property with specification of the work required. Mr. R. T. Jones asked whether the Survey Committee had taken into consideration the suggestion of Mr. Gordon Richards to extend the breakwater at Balaclava. Mr. Lloyd Hughes said this would be considered at the next meeting of the Survey Committee. The trading returns for March were the largest for several years. Eighteen vessels called in the port and landed 3,140 tons of cargo, which was the highest since 1931.

Money from Mersey Sands.

Sand-refining is one of the lesser-known industries of Merseyside. The sand, reclaimed from the upper reaches of the river, is brought up by the grabs of dredgers and after the silt and sediment are washed away, the pure sand, after special screening and refining processes, is utilised in the building trades. In this way about 8,000 tons of sand a week are reclaimed from the river, compared with 300 tons a week 20 years ago. The prime grade of fine sand is used for speciality asphalt work and also for tarring plants; a secondary coarser grade supplies a high resistance to breakage when used in reinforced concrete; while a third grade is used for plaster work, especially on the mesh screening of the walls. The sand is also used for composition floor covering, and a particularly hard surface is provided when the floor is topped with a mixture of sharp sand and granite. A special type of dredger is used for sand reclamation. It not only washes and refines the sand, but conveys it to the dock appropriations and the discharging quays. One well-known firm engaged in river dredging has four dredgers at work, according to the demand, and a fleet of about fifteen auxiliary steam barges to carry the sand after it has been dragged from the banks and bed of the Upper Mersey. Two dredgers can dredge as much as 2,000 tons of sand in a tide.

Quick Discharge of Whale Oil.

Two Norwegian whaling factory ships sailed from Messrs. Lever Bros. dock at Bromborough on April 13th. The ships arrived at Bromborough in the early part of April with the second catch of the season from the South Antarctic whaling grounds. One ship discharged by pipeline into a mammoth storage tank on the quayside approximately 9,000 tons of whale oil in 45 hours—a record.

Morecambe Sea Wall.

Approval in principle has been given by the Morecambe Council to a scheme for the construction of a new sea wall between the Midland shelter and the West End Pier at an estimated cost of £51,000. The proposed scheme provides for the construction of two promenades, the lower one gradually sloping upwards 20 ft. to the higher promenade, with 2 ft. 6 in. coping.

Bromborough Dock Master.

Capt. John K. McCartney has been officially appointed dockmaster at Messrs. Lever Bros.' £1,000,000 dock at Bromborough. Capt. McCartney comes off a long line of seafarers and began his career in the once-famous Inver Line of sailing ships. He has served in the Harrison Line, the Brompton S.S. Company, and the United Africa Company.

Dredging of Rivers.

To the River Crossens Catchment Board the progress of the dredging work in connection with the main rivers improvement scheme was reported. It was stated that the dredging of the sluice had been carried out for a distance of 7,330 lin. yards above the Old Sluice Bridge, and the bank between Fine Jane's and Sandy Brooks had been removed for a distance of 3,660 lin. yards above Cylinder Bridge.

Important Trade Expansion at Liverpool.

The commercial community of Liverpool should be elated at the extraordinary bright outlook of the returns of the Mersey Docks and Harbour Board concerning the trade of the port for the month of March, 251 vessels being dealt with as against 229 during the same month of the previous year. The increase from July 1st, 1935, to the end of March last is even more illuminating, as it actually shows that 950 more vessels were dealt with at the port as compared with the corresponding period 1934/35. The increased tonnage of these vessels approximate half a million, an interesting indication of the consistent progress the port is making.

It is gratifying to be also able to record a definite and substantial improvement in traffic. As compared with the period July to March, 1935, grain imports have increased 403,000 qrs., apples 454,000 cwts., pears 18,600 cwts., oranges 154,000 cwts., grapefruit 36,000 cwts., cotton 200,000 bales, and sugar 150,000 tons.

Exports also are increasing, another very good sign. Railway materials and equipment and iron and steel manufactures of all kinds are being shipped in greater tonnages each month. Large numbers of locomotives and tenders have recently been shipped to China, Brazil and New Zealand and the Dock Board have further shipping enquiries in this connection.

Liverpool's supremacy as an export agency is not always properly recognised. The official Board of Trade returns recently published shewed the value of the United Kingdom exports of British manufactured goods at nearly £396,000,000. Of this amount over £114,000,000 were shipped through Liverpool and Birkenhead, which total exceeds the combined figures of Glasgow, Manchester, Hull, Southampton, Middlesbrough and Bristol.

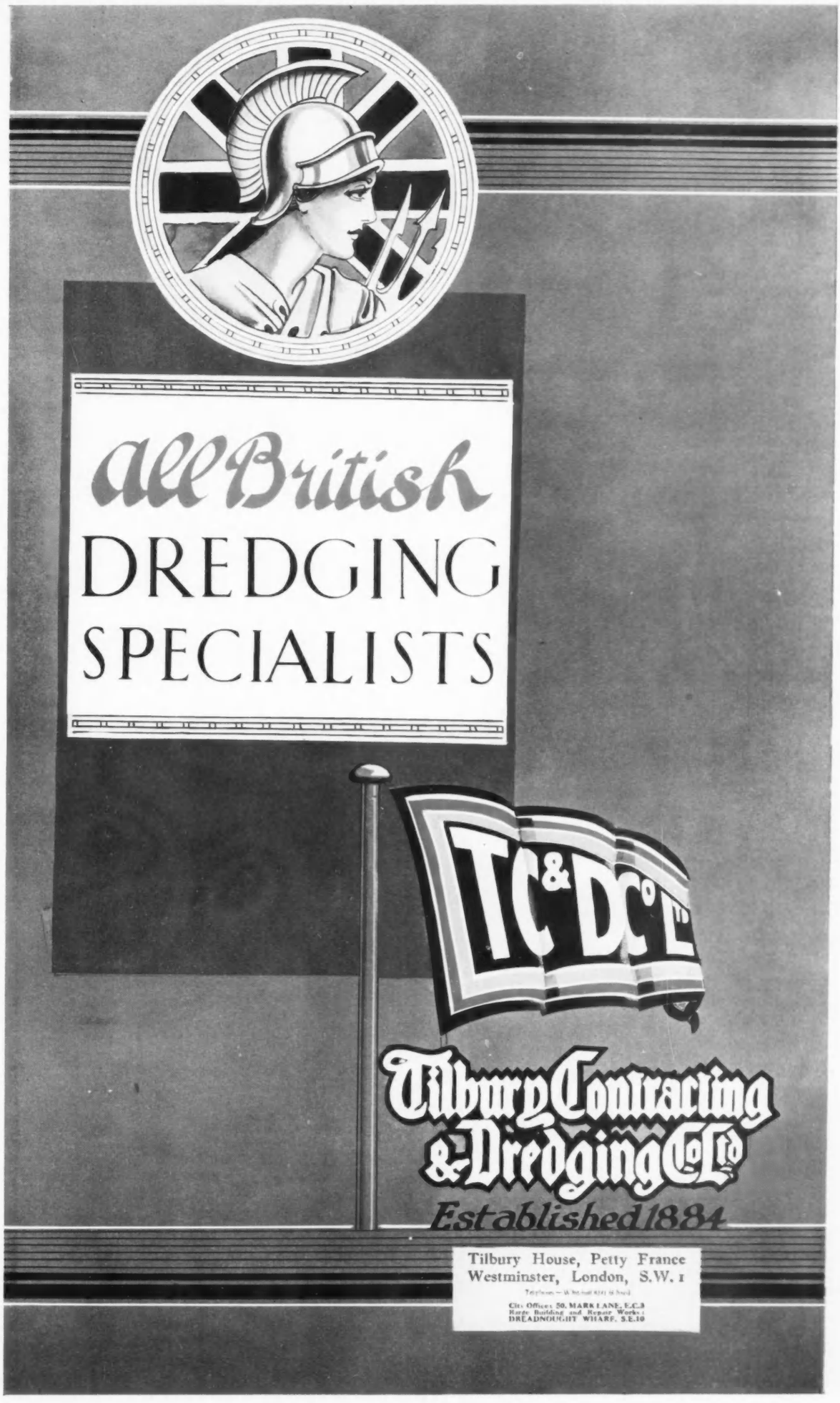
Weser Inland Shipping in February.

Water conditions on the Weser during February, 1936, fluctuated considerably. However, barge trains were spared any disturbances worthy of note.

In March the good water conditions continued at first. But from the 13th on the Upper Weser and from the 19th on the Middle Weser it was no longer possible to load to any full extent. This is a serious and early end to full loading.

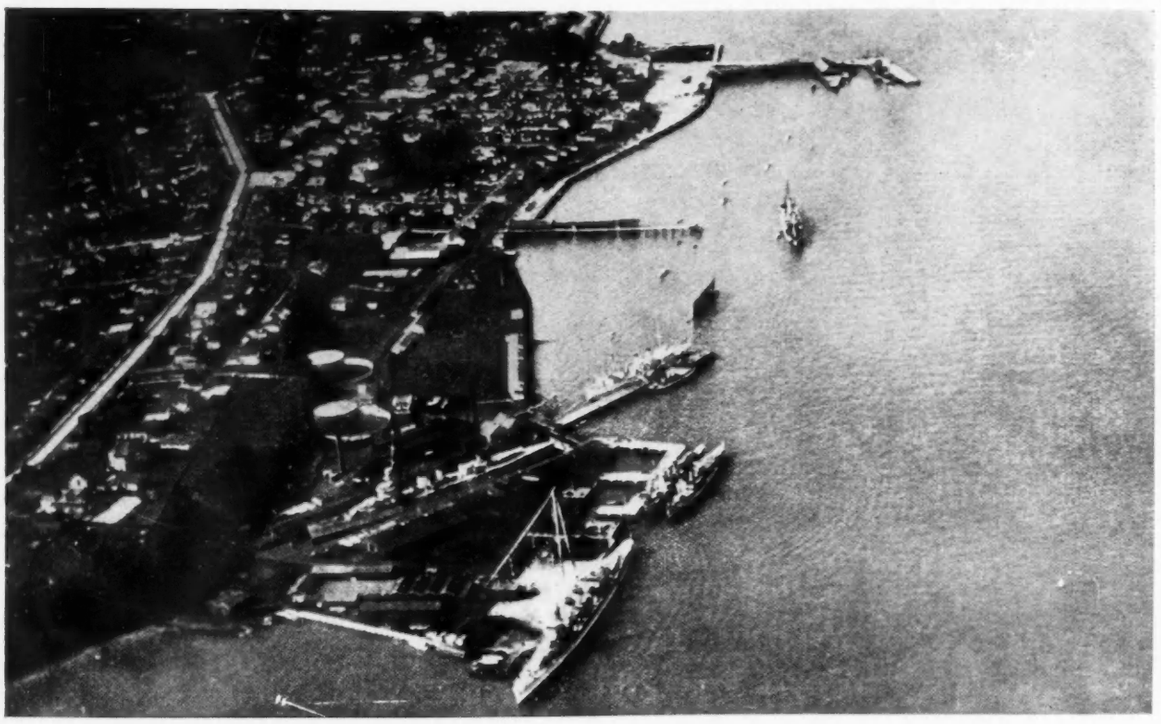
171,800 tons were carried on the Middle Weser through the Bremen Weser Lock and on the Kustenkanal through the Oldenburg Lock, that is 59,700 tons, or more than 25 per cent., less than the previous month. On both routes traffic was considerably less: 167,900 tons passed through the Bremen Weser Lock, being a decrease of 48,200 tons, or 22 per cent.; 3,900 tons passed through the Oldenburg Lock, which is 11,500 tons, or 75 per cent., less. It must be remembered that, due to repair work on the Dortmund-Ems-Kanal in the last third of January and the first third of February, trade on the Kustenkanal was held up between Bergeshovede and Herbrum, so that the month cannot be compared with normal months. Downstream 139,300 tons passed through the Bremen Weser Lock in February, 45,600 tons, or approximately 25 per cent., less than in January, chiefly due to smaller shipments of coal, gravel, salts and stones. Upstream also there was a decrease, even though grain shipments were 7,200 tons larger. Total carried upstream was 28,600 tons, i.e., 2,600 tons, or 8 per cent., less than in the previous month, chiefly due to decrease in transport of piece-goods, timber and flour. In the first two months of the year a total in both directions of 384,000 tons was carried, i.e., 105,500 tons, or 38 per cent., more than in the same period of 1935. However, there was an increase of 69 per cent. in downstream traffic, which rose from 191,000 tons to 324,200 tons. The greatest increase was in building materials, which were 80,000 tons more than in the previous year, i.e., almost double. Coals increased by 50,000 tons. This increase is only due to winter covering purchases on the part of industry. Unfortunately bunker coals have experienced no stimulation, because of the excessive canal dues. Of the other goods carried, piece goods and inland grain increased, while potash salts decreased. Upstream quantity carried decreased by 26,800 tons, or 31 per cent., to 59,800 tons. Only grain increased slightly. All other goods carried upstream decreased.

Downstream only 1,500 tons were carried through the Oldenburg Lock, compared with 13,500 tons in January. The reason for this enormous decrease is that no coal was carried, as it was sent via the Middle Weser. Upstream, quantity carried was 2,400 tons, i.e., 500 tons, or one-third, more than in the previous month.



WHEN REPLYING PLEASE MENTION "THE DOCK AND HARBOUR AUTHORITY."

The Harbours of Auckland, New Zealand



Naval Base and Calliope Dock. H.M.S. "Dunedin" in Dock. H.M. Ships "Diomede," "Laburnam," "Veronica," "Philomel" and "Whakakura" at Wharves. Cable Steamer "Recorder" at anchor in Stream.

Auckland Harbour, Main Wharves: Total Tonnage of Vessels at Wharves, gross 70,193, net 42,747.

The Harbours of Auckland, New Zealand

Waitemata and Manukau

ALTHOUGH the discovery of New Zealand by Europeans goes back to Abel Tasman's voyage in 1642, it was not till nearly two hundred years later that the Waitemata and the Manukau Harbours—the ports of the City of Auckland—were discovered. Captain Cook never entered either of them, but it is interesting to note that when voyaging between Cape Colville and Cape Rodney, and remarking the islands which lay off the Waitemata, he hazarded the opinion that "it appeared very probable that these formed some good harbours."

The double honour of being the discoverer of both the Waitemata and the Manukau belongs to the Rev. Samuel Marsden, who, both as a missionary and an explorer, has large claims to remembrance. His pioneer visits to these harbours were made in 1820, and he was the first man to embark upon their waters and to estimate their importance. That his voyages were made in the launch of H.M.S. "Coromandel" and in native canoes does not detract in the least from the credit he is entitled to.

Two other names are associated with the discovery of the Waitemata, Major R. A. Cruise and Captain Dumont D'Urville. Cruise was a passenger on board the schooner "Prince Regent" (30 to 40 tons), which first navigated the approaches to Auckland Harbour and thus demonstrated its accessibility. This eventful voyage was made in the same year as Marsden made his discovery of the Waitemata and Manukau. D'Urville, a French navigator, although deprived of the honour of priority in his work of navigation, did such good service in 1827 in the course of charting the channels leading to the Waitemata, that he deserves honourable mention in connection with the opening up of the Waitemata.

The Waitemata did not become of any importance until it was selected by Lieut.-Governor Hobson as the site of the capital of the Colony in 1840. Not until two days before the official ceremony of founding the City of Auckland on 18th September, 1840, did an overseas vessel arrive in the harbour; this vessel was the barque "Platina." With this event the history of Auckland Harbour commences.

Waitemata Harbour

No more fitting words can be found to describe Waitemata Harbour than those used by the Hon. Wm. Swainson (who was for over 15 years Attorney-General for New Zealand), when writing in 1859:—"About one hundred and fifty miles from the North Cape, the Northern Island of New Zealand is almost intersected by two large estuaries, which indent the coast so deeply on either side that their waters are separated only by a narrow isthmus. Deep in the south-western extremity of the estuary of the Thames, and completely shut in by a group of small islands, is the land-locked harbour of the Waitemata. On the opposite or western coast, and separated from the Waitemata only by an isthmus some five miles in breadth, is the estuary of the Manukau; and the isthmus thus formed by the Waitemata and the Manukau was selected by Captain Hobson as the site for the Capital of New Zealand.

"Completely land-locked, studded with islands of various size and form, its outline broken by numerous deep bays and jutting headlands, the harbour of Auckland (the Waitemata), without having the picturesque bold scenery of many of the harbours of New Zealand, presents the appearance of an English lake. The Flagstaff Hill and the North Head bound it on the north; over the low neck of land which connects these mound-like hills is seen the rugged volcanic island of Rangitoto, with its triple peaks; Waiheke and the neighbouring islands filling up the middle distance, and the distant range of the Coromandel Highlands forming the background of the picture. The Waitemata is seen to the greatest advantage on one of those rare days when a perfect calm prevails; with a deep but soft blue sky, studded here and there with fields of snow-white silvery clouds seen through a glistening atmosphere; thus seen, under all the advantages of light, colouring, and repose, the harbour presents a scene of placid beauty which it would tax the imagination to surpass."

Tanker "Binta" discharging Motor Spirit at Western Wharf, Auckland Harbour.

Onehunga Wharf.

Constitution of the Port Authority.

The port is administered by a public Board constituted and empowered under Act of Parliament of the General Assembly of New Zealand. The first Board was appointed in 1871, but since then its constitution has been materially altered. It now consists of fifteen members.

Administration of Port.

The Board is empowered to construct and maintain harbour works; construct warehouses, sheds, etc., for the accommodation of goods; provide and maintain freezing works and cool stores; provide and work cranes, weighing machines and other appliances; provide and maintain tugs, dredgers, etc.; grant by lease or license the use of its lands, warehouses, wharves, etc.; carry on the business of a wharfinger, warehouse keeper or any other business in the interests of importers or exporters or of shipping; lay down railway or tramway lines or grant rights to others to do so upon lands vested in it; grant by lease or license the use of its lands for the building of ships, wharves, landing places, baths, stores, freezing works, etc.

The construction of harbour works is, however, subject to the approval of the Governor-General in Council being given to the plans.

By-Laws.

The Board is empowered by by-law: (1) to regulate the movements of shipping in the harbour; (2) to regulate the use of docks, wharves, etc.; (3) to levy dues and charges on shipping and goods for the maintenance of the harbour and the provision of facilities for ships and goods; (4) to license ships trading within the harbour, also boatmen, porters, carriers and others and fix fees for such licenses; (5) to fix pilotage rates and regulate the conduct of pilots; and (6) generally to carry out the provisions of "The Harbours Act" within the limits of the harbour.

Area Served by Port.

The area served by the Port of Auckland covers practically the whole of Auckland Province comprising 25,351 square miles, with a population of 523,050 at the present time.

The Harbours of Auckland, New Zealand—continued

Electric Quayside Cranes, Prince's Wharf.

Staff.

The administrative staff numbers over 200, and in addition there are about 500 casual employees on the Board's pay roll. The latter are chiefly engaged in construction works as the Board has usually found it cheaper and more effective to carry out its own works by day labour than by contract. The wages, holidays and conditions of employment of these men are subject to Arbitration Court awards governing each trade.

Description.

The Port of Auckland is situated in the lower reaches of the Waitemata Estuary, at the head of the Hauraki Gulf. The estuary has a total area of 77 square miles and a water frontage of 198 miles. It is completely sheltered by an outlying chain of islands and by the peninsula at the northern entrance. Its geographical position (observation spot) is latitude 36 deg. 49 mins. 56 secs. S., and longitude 174 deg. 47 mins. 57 secs. E. The inner or commercial harbour has a length of 54 miles, by an average width of 1 mile. The anchorage is of the very best description, with water from 5 to 12 fathoms, with good holding ground. The tide rises and falls from 5 ft. 6 in. (neaps) to 12 ft. (springs). The whole of the harbour and approaches are well lighted, and the channels, shoals, etc., are clearly marked by lighted buoys, unlighted buoys, and beacons, so that at any hour the port may be entered with perfect safety.

The Limits of the Port.

All that area of tidal waters within a straight line drawn from the northern extreme of the eastern head of Tamaki River to the southern extreme of Park Point, Waiheke Island; thence by high-water mark of ordinary spring tides to the northern extreme of the western entrance point to Owhanaki Bay; thence by a straight line to the southern extreme of Home Bay Point, Tapu (Motutapu) Island; thence by high-water mark of ordinary spring tides to Emu Point, and onwards, following the eastern shore of Islington Bay inwards to its head at its narrowest width and its western shore onwards to Motukoreho Channel, continuing along the southern and western shore of Rangitoto Island to a position where a straight line projecting 270 deg. passes through Rangitoto Beacon to the mainland.

S.S. "Trojan Star" loading Chilled Beef.

Mount Victoria, 270 ft., with a signal station on its summit, and North Head, ½ mile eastward, are two conspicuous round hills easily distinguished at a distance of 5 or 6 miles; and Rangitoto Island, circular in shape and gradually rising to 854 ft., on the eastern side of the harbour entrance, makes a prominent mark for vessels approaching from any direction. Its crater-like summit, on which are three nipples presenting nearly the same appearance from all points of view, usually is seen at a distance of over 30 miles.

Waitemata Estuary and River.—Extends for a distance of approximately 8 miles to the westward of Kauri Point, from which branch off several important creeks, including Lucas, Henderson, and Whau Creeks, which are navigable by small vessels. The head of the Whau Creek is separated from the waters of the Manukau by a portage of only 1½ miles.

Approaches to Auckland Harbour.—There are four channels of approach to Auckland Harbour, between the off-lying islands and the mainland.

The entrance to the Rangitoto Channel lies between Rangitoto Island and the mainland to the westward, and is the western and principal approach. This channel is approximately 3 miles long, and has a width at the entrance of approximately 2 miles from shore to shore. The width of the deep-water channel at the entrance between the 5-fathom banks is approximately 4,500 ft., tapering gradually until it reaches its narrowest part near Rough Rock Beacon, where the width between the 5-fathom banks is 2,400 ft. The minimum depth of water in the deep-water channel is 31 ft. 6 in. at L.W.S.T.

M.V. "Columbia" discharging Rock Phosphates with Quayside Cranes and Grabs.

The northern approach is through Motuhihi Channel, which lies between Motutapu, to the north-westward, and the western end of Waiheke Island and Motuhihi to the south-eastward; thence through Motukoreho Channel, which lies between Rangitoto Island, to the northward, and Motukoreho or Brown's Island and the mainland to the southward.

The eastern approach is through Waiheke Channel, which lies between Waiheke Island, to the westward, and Pakotoa, Rotorao (Rotaro), and Ponui Islands to the eastward; thence through Tamaki Strait, which lies between Waiheke Island and the mainland to the southward; thence through Motukoreho Channel, as previously described.

The south-eastern approach is through Ponui (Sandspit) Channel, which lies between Ponui and Pakihi Islands; thence through Tamaki Strait and Motukoreho Channel, as previously described.

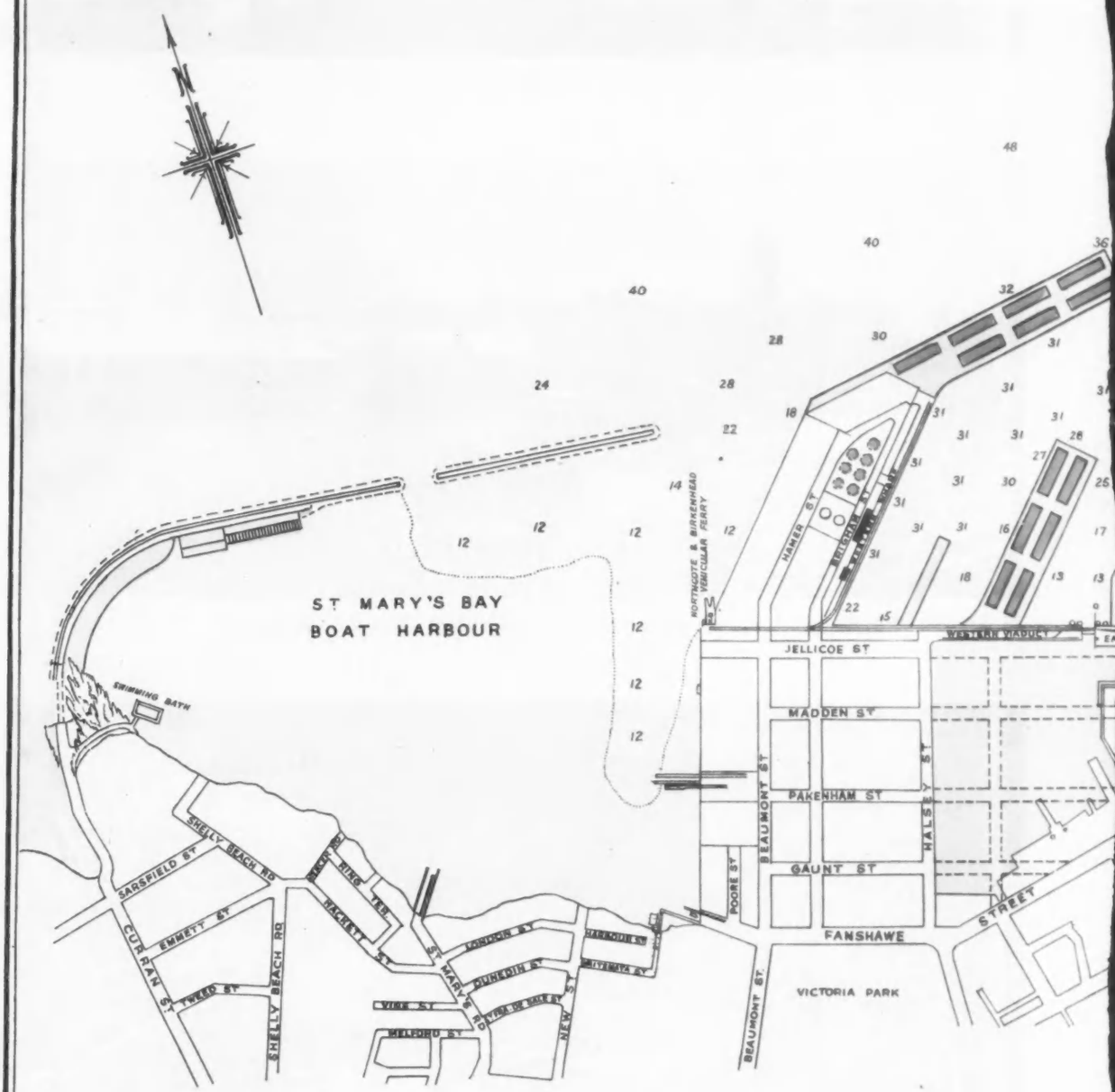
Dredging.

Ample depth of water is provided and maintained at the wharves and the approaches thereto; the work being done by the Board's dredging plant, consisting of the powerful bucket ladder hopper dredger "Hapai" (capable of dredging to a depth of 45 ft.), and a steam suction and delivery dredge. Two

PORT OF AUCKLAN

UNDER THE JURISDICTION OF THE AUCKLAND HARBOUR BOARD

NOTE;– Proposed New Works are shown RED.



SCALE OF FEET.

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WILLIAM G. FOXLOW, LITH.

LAND.

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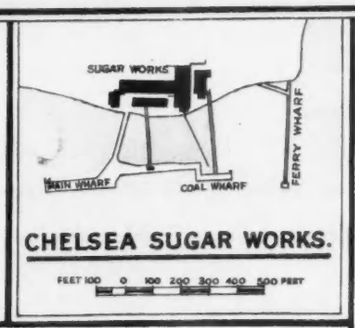

CHELSEA SUGAR WORKS.

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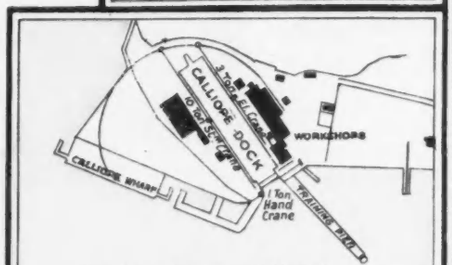

CALLIOPE DOCK.

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AUCKLAND AND MANUKAU HARBOURS.

Scale.

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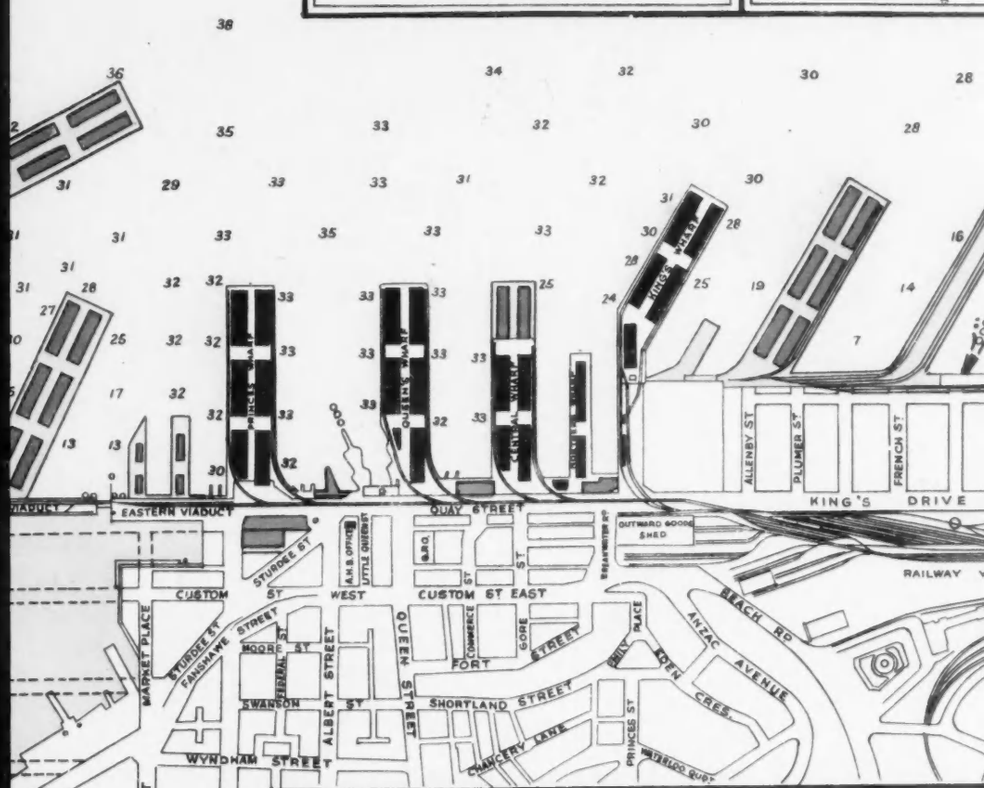

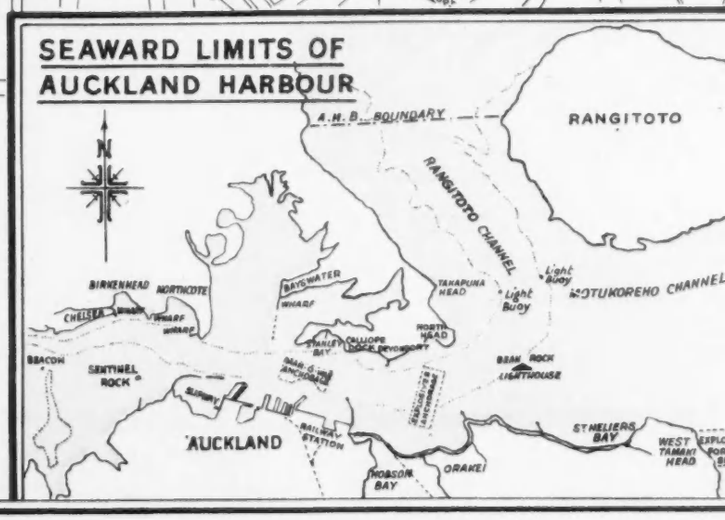

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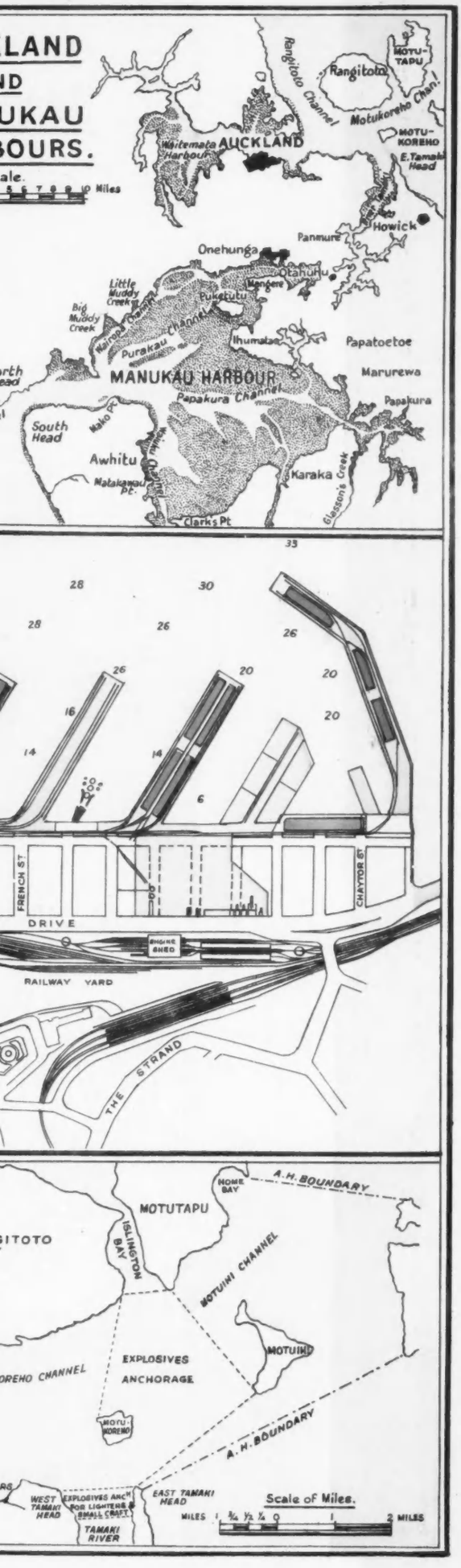
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MOTU-KOREHO
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Panmure
Onehunga
Otahuhu
Mangere
Little Muddy Creek
Big Muddy Creek
Puketutu
Pukaki Channel
Pukaki Creek
Purakau
Ihumatao
Papatoetoe
Marurewa
MANUKAU HARBOUR
Papakura Channel
Papakura
South Head
Kako Pt
Awhitu
Matakawau Pt.
Karaka
Glasson's Creek
Clark's Pt
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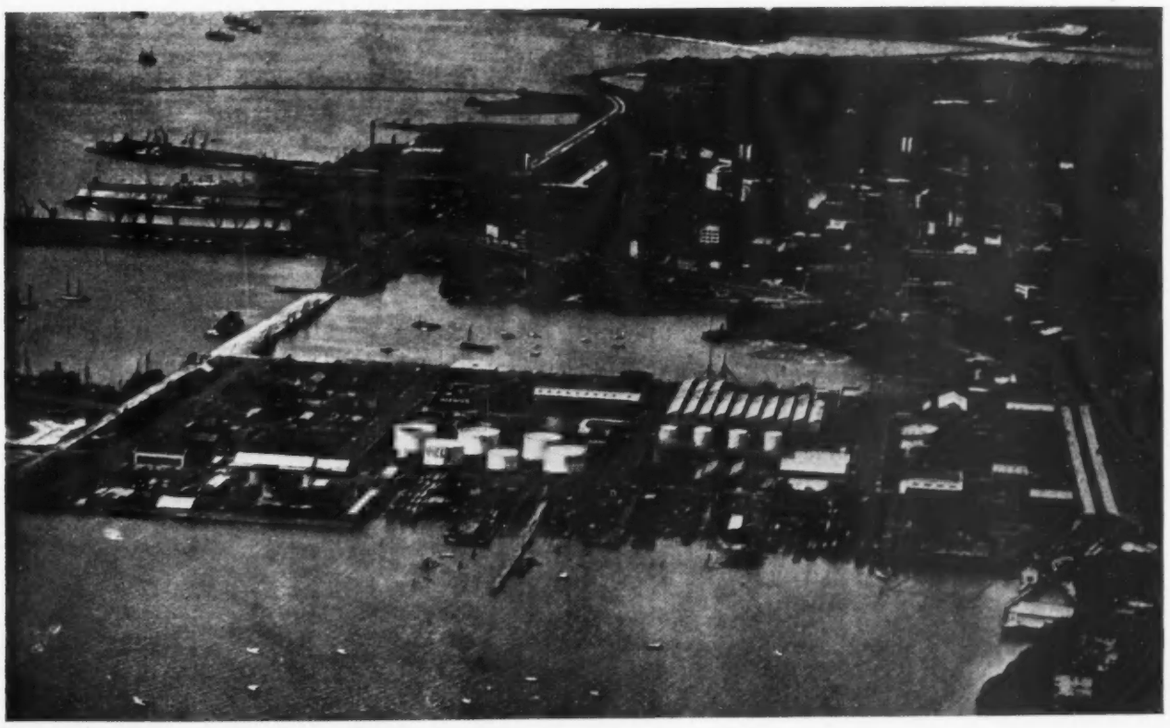
CHAYTOR ST
DRIVE
ENGINE SHED
RAILWAY YARD
THE STRAND
BITOTO
HOME BAY
A.H. BOUNDARY
MOTUTAPU
ISLINGTON BAY
MOTUIHI CHANNEL
MOTUIHI
OREHO CHANNEL
EXPLOSIVES ANCHORAGE
MOTU-KOREHO
A.H. BOUNDARY
WEST TAMAKI HEAD
EXPLOSIVES ANCH FOR LIGHTERS & SMALL CRAFT
TAMAKI RIVER
EAST TAMAKI HEAD
Scale of Miles.
MILES 1 ¾ ½ ¼ 0 1 2 MILES

The Harbours of Auckland, New Zealand

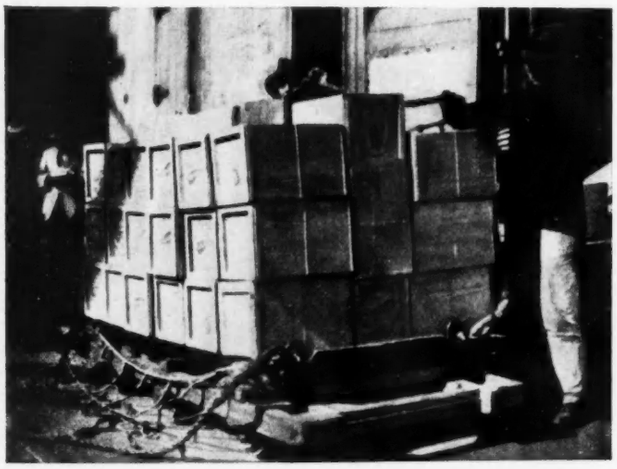
Interior of Shed, Prince's Wharf.

The Ferries, Ferry Building and Harbour Board Office.



Auckland Waterfront, showing Reclamations and Oil Companies' Installations.

The Harbours of Auckland, New Zealand—continued



Loading New Zealand Butter.

500-ton hopper barges are also provided for carrying spoil to sea.

Wharves and Berthage Accommodation.

The commercial harbour is protected on the east and west by tide deflectors. A comprehensive scheme of harbour improvements, shown on Supplement, is now in progress.

All the main wharves are built of reinforced concrete, the general design being a central roadway 60 ft. wide with sheds on either side 320 ft. long and from 60 to 80 ft. wide, and quays on the water side 32 ft. wide with double lines of rails having convenient cross-overs. The goods are loaded into vehicles at the central roadway from loading banks and chutes provided for the purpose.

The total length of berthage at the city wharves and breastworks is 23,217 ft., of which 10,977 ft. is available for overseas shipping, 10,604 ft. for coastal traders, and 1,626 ft. for the harbour ferry services. The total length of berthage at the suburban wharves is 3,400 ft.

Vessels discharge their cargoes on to the quays whence the goods are trucked into the sheds and sorted into stacks according to marks. Vehicles are not allowed in the sheds, but are loaded or unloaded from loading banks or chutes at the central roadways. The later sheds, as at Prince's Wharf, are two-storeys in height with flat roofs, and are provided with cargo shutes, electric roof cranes and monorail cranes for the expeditious handling of goods. The floor loadings allowed are as follows:—Lower floor, 4 cwt. per sq. ft.; upper floor, 3½ cwt. per sq. ft.; roof, 1½ cwt. per sq. ft.

The Plan of the city wharves (see Supplement) shows the berthing accommodation and the depths in feet at M.L.W.S., as existing in August, 1935.

The depth of water provided at the berths ranges from 12 ft. at L.W.S.T. for coastal vessels, to 35 ft. at L.W.S.T. at the main wharves for oversea vessels. This can be increased to 40 ft. or more if necessary. The largest vessel to enter the port was H.M.S. "Hood," 41,200 tons, 861 ft. long, 103 ft. beam, and drawing 32 ft. 6 ins., which berthed alongside Prince's Wharf in May, 1924. The largest merchant vessels to visit the port are the Matson Navigation Co.'s steamers "Mariposa" and "Monterey" (24,156 tons gross), the Cunard Steamship Company's s.s. "Carinthia" (20,277 tons gross), and s.s. "Franconia" (20,175 tons gross).

King's Wharf, completed in 1908, at a cost of £231,000, has 2,588 lin. ft. of berthage with depth of water at L.W.S.T. varying from 12 ft. at the inner end to 31 ft. at the outer end. It has five single-storey steel sheds, each 60 ft. wide and varying in length from 257 to 340 ft. The wharf is connected on both sides with the railway system of the Dominion. In addition, the inner western portion, known as the Low Level Landing, has 500 ft. of berthage for coastal vessels.

Queen's Wharf, completed in 1914, at a cost of £384,000, has 2,220 lin. ft. of berthage with 32 to 35 ft. of water alongside. It has three two-storey and two single-storey steel sheds, each 320 ft. long by 80 ft. wide. It also is connected with the railway system on both sides. Accommodation for H.M. Customs, the Water Police, the Shipping Companies and Receiving Firms is provided on this wharf by the Board.

Central Wharf, built in 1921, at a cost of £190,000, has 1,849 ft. of berthage, with four single-storey concrete sheds, each 320 ft. long by 60 ft. wide. It has rail connection on both sides.

Western Wharf, built in 1922 and extended later, total cost £136,338, has 1,546 ft. of berthage with 30 ft. of water, and is used principally by vessels discharging coal, oil and timber.

Six separate oil companies have oil pipe-lines laid under the wharf with numerous stand pipes for the receipt of bulk oil from or delivery to shipping. The combined tankage for the storage of motor-spirit and kerosene on reclaimed land in the vicinity of the wharf amounts to over 10,000,000 gallons, and of fuel oil 2,250,000 gallons.

Prince's Wharf, completed in 1924 at a cost of £600,000, has 2,714 ft. of berthage with 32 to 35 ft. of water alongside. It has six two-storey reinforced concrete sheds, each 320 ft. by 80 ft., with flat roofs, and has railway connection to both sides. It is fully equipped with the most modern appliances for the rapid handling of cargo.

Northern Wharf, completed in 1911, at a cost of £52,000, has 1,522 ft. of berthage, and is used mainly by coastal vessels. It has two large cargo sheds, but no railway connection.

In addition to the city wharves there are numerous piers and jetties at the various watering-places and up-river settlements for the use of ferry steamers and small craft. The Board has also provided stages at Auckland, Devonport, Northcote and Birkenhead for the use of vehicular ferry steamers.

The berthing of vessels is controlled by the Board, and the Masters or Agents of vessels desiring to load or discharge cargo are required to apply to the harbourmaster for a berth and to give particulars of the vessel's draft, length and beam; also to deposit at the Board's Office a copy of the manifest and make suitable arrangement for payment of dues.

Railways.—All principal wharves are adequately served by railway sidings which are directly connected with and are operated by the New Zealand Government railway system.

Transit Sheds.

For the sorting and storing of cargo on the City Wharves, the Board has provided 15 single-floor and 9 two-floor transit sheds with a total floor space of over 850,000 sq. ft. and a gross capacity of over 10,000,000 cub. ft.

Cargo Handling Appliances.

The wharves are well equipped with modern electrically-operated quay cranes for the loading and discharging of cargo. In conjunction with the facilities available for the handling, sorting, stacking and delivery of cargo on the wharves and in the sheds, these cranes enable cargo handling operations to be conducted most expeditiously, and there are few ports in the world where shipping can obtain quicker despatch.

The crane equipment includes 22 five-ton portal and semi-portal cranes varying in maximum radius from 44 ft. to 60 ft., with lifting speeds at full load of 120 ft. per minute and 2 tons at 275 ft. per minute; and 24 three-ton portal and semi-portal cranes with maximum radius from 53 ft. to 70 ft., and lifting speed at full load of 250 ft. per minute.

Four electric five-ton travelling roof cranes for stacking and handling of cargo between, and on the roofs of sheds, are provided at Prince's Wharf, and six one-ton mono-rail cranes are provided on the road-side of sheds for handling packages from top floor to road vehicle and vice versa.

Electrically-operated capstans are installed in suitable positions on all wharves to assist in the handling of railway wagons, etc.

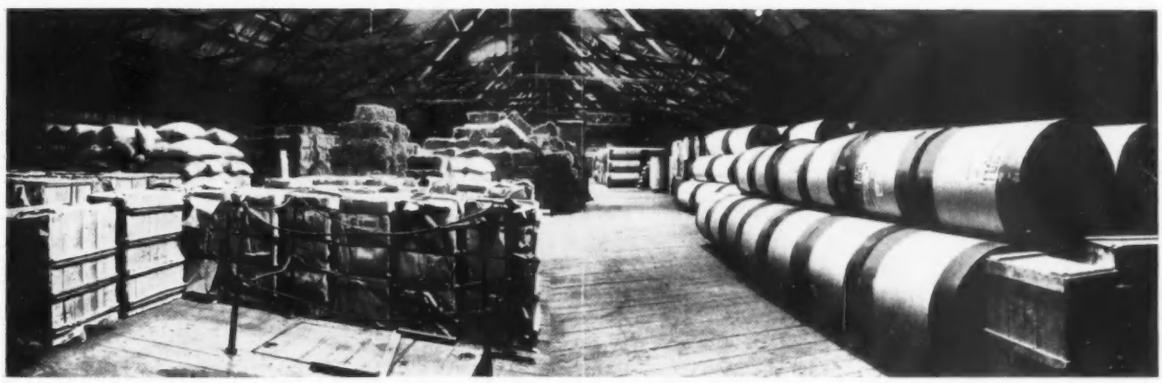
Self-dumping grabs are available for use with quay cranes for the discharge of bulk cargoes of coal, phosphate rock, sulphur, etc., direct into railway wagons.

Double-storey sheds are equipped with electric lifts, elevators, hoists and chutes for the transfer of cargo from one floor to another, and wide balconies on the quay side enable cargo to be landed direct on to the upper floors.

Prince's Wharf: Roadway and Loading Banks.

The Harbours of Auckland, New Zealand

Main Wharves, Auckland.



Interior of Shed, Queen's Wharf.

Auckland Harbour, showing Entrances, Wharves and Reclamations.

The Harbours of Auckland, New Zealand—continued

S.S. "Northumberland" in Calliope Dock.

The average rate of work over all classes of general cargo is 1,300-1,400 tons per day of 12 hours; but over 2,000 tons per day has been reached in the case of special cargoes.

Bulk cargoes such as rock phosphate and sulphur, are discharged at the rate of 200-300 tons per hour, according to the number of cranes and grabs used. This class of cargo is discharged direct into railway wagons.

Floating Crane.

The Board has provided a self-propelling floating crane, capable of lifting up to 80 tons. The crane is provided with two gears, one capable of lifting up to 20 tons, and the other up to 80 tons. The jib can be derricked from the minimum to the maximum radius by heavy steel screws, and can be swung with suspended load through a complete circle.

Coal and Oil Stocks.

Supplies of coal are kept by the various coal companies, stored afloat in hulks. The hulks are moved to vessels coaling, but occasionally coal is transferred direct from colliers. About 100 tons an hour can be delivered to ships able to receive it. Motor spirits and fuel oil may be obtained from the oil companies by pipe-line at Western Wharf, or from hulks moored in the harbour.

Docking Accommodation.

Calliope Dock, on the northern shore of the harbour, provides ample docking accommodation to suit all classes of shipping. The maximum dimensions of a vessel that can be docked are 540 ft. overall by 65 ft. beam. Extensive plant is installed at the dockyard, enabling any repairs to warships and merchant vessels to be undertaken. There is at all times a large staff of skilled workmen available for any repairs that may be required.

DIMENSIONS OF CALLIOPE DOCK.

	ft.	in.
Length from caisson to end of recess at head of dock at level of blocks 4ft. 6in. high	553	6
Width over all	110	0
Width at entrance at level of coping	80	0
Width at entrance between fenders (H.W.O.S.T.)	77	5
Width at level of blocks 4ft. 6in. high	65	7½
Depth of water on sill (H.W.O.S.T.)	33	0

Auckland is the naval base for New Zealand, and under arrangement with the Admiralty, a complete plant of the most efficient and modern machinery has been provided at Calliope Dockyard, the whole of the work having been done with the authority and under the supervision of the Admiralty officers, who have chosen every machine that is in the workshops. This plant includes 10-ton steam crane and 3-ton electric travelling dockside crane; engines, boilers; overhead travellers; and all appliances, machinery and tools required to render the plant adequate to repair any of His Majesty's ships upon the station, or any merchant vessel visiting the port. The dock and machinery will be available for use, when not required for His Majesty's vessels, in effecting repairs to any merchant vessel requiring the same.

In 1933-34 the dock was used by 138 vessels, with a tonnage of 66,658 net.

Patent Slipway.

The Board has provided on the western side of the Freeman's Bay Reclamation a patent slipway. The maximum displacement of vessels that can be hauled up is 600 tons. The dimensions are:—

DIMENSIONS OF PATENT SLIPWAY

	ft.	in.
Extreme length	660	0
Length of cradle	211	3
The cradle can be divided into a top cradle of	111	6
And a bottom cradle of	99	9
Width of cradle	32	0

	Combined cradle ft.	in.	Top cradle only ft.	in.	Bottom cradle ft.	in.
Depth of water over keel blocks at H.W.O.S.T.—						
Forward	7	3	7	3	14	3
Aft	20	5	14	3	20	5

(This level is 13.50 ft. above Auckland Dock sill).

Ferry Services.

Fast and commodious ferry steamers are employed in the passenger service between the City of Auckland and the various maritime suburbs and watering-places of Devonport, Stanley Bay, Takapuna, Bayswater, Northcote, Birkenhead and Chelsea, where wharves are provided by the Board. Connection between the City and the north shore of the harbour is also made by a regular service of vehicular steamers, for which the Board has provided special vehicular landing stages.

Railway System.

Auckland is connected by railway northward to the Bay of Islands, 182 miles, southward to Wellington, 426 miles; and eastward to Rotorua and the Bay of Plenty.

Shipping.

The shipping inwards at the Port of Auckland for the twelve months ended 30th September, 1934, consisted of:—

	No.	Gross Tons	Net Tons
Warships and Government Vessels	37	102,385	93,216
Merchant Vessels—			
Overseas	318	3,152,386	1,952,270
Intercolonial	97	497,040	274,765
Coastal	5,344	988,545	523,044
Total	5,796	4,740,356	2,843,295

The Harbours of Auckland, New Zealand—continued

Harbour Board's Floating Crane "Mahua."

Of the merchant vessels arriving, 98.66 per cent. were British owned; the balance being principally American, Japanese and Norwegian.

Overseas Services.

Auckland is the port of call in New Zealand for the steamers of the Canadian and Australasian Royal Mail Line, trading between Sydney, N.S.W., and Vancouver, British Columbia; and of the Matson Line, trading between California and Australia. It is the first port of call for steamers from the Eastern States of America passing through the Panama Canal; for the regular traders of the Canadian Government Merchant Marine, the Union Steamship Company, and the Oceanic Steamship Company in the Trans-Pacific trade; also for the ships from Great Britain of the New Zealand Shipping Company, Commonwealth and Dominion Line, Shaw, Savill and Albion Company, and the Federal S.N. Company, Ltd. The U.S.S. Company, with its large fleet of passenger and cargo boats, serves an important Dominion and Inter-colonial trade, and with the Huddart Parker, Ltd., provides regular passenger services.

Coastal Fleet.

Auckland possesses more coastal vessels than any other port in the Dominion, the bulk of the carrying trade to and from other parts of the Province being done by these small steamers and sailing vessels.

Trade.

In 1934 the cargo handled at Auckland amounted to 1,087,635 tons inwards and 490,245 tons outwards. Inter-harbour traffic amounted to 51,528 tons, a total of 1,629,408 tons. The value of the imports was £8,839,629, and of the exports £14,848,965.

The prosperity of the port is largely dependent on the agricultural and pastoral productivity of the Province. Last year the principal exports were:—

Butter	boxes	3,691,765
Cheese	crates	281,987
Milk Products	tons	14,937
Frozen Meat	tons	33,487
Preserved Meat	tons	3,698
Wool	bales	87,996
Tallow		6,470
Skins and Hides	tons	6,903
Wheat, Oats, Flour and other produce	tons	20,457
Fish (frozen and fresh)		1,094
Fruit (preserved and fresh)	tons	8,787
Kauri Gum	tons	3,596

The industries of the Province were responsible for the following exports from the port:—

	Super Feet
Timber	2,973,120
Coal and Coke	3,613
Artificial Manures	11,819
Sugar	43,797
Pumice Sand	2,461

Revenue.

The Board is dependent for its revenue upon the dues charged to shipping and goods and upon the rents from its endowments. The Board does not seek to make large profits on its operations, and is content if it can a little more than make ends meet.

Since its inception the Port of Auckland has been steadily progressing, the revenue of the Board having increased from £12,498 in 1872 to £339,513 in 1934.

The revenue earned during the year ended 30th September, 1934, amounted to £339,513. The expenditure was £274,644. Appropriations to sinking funds and other reserves amounted to £43,162, and £27,320 was written off for depreciation.

Manukau Harbour revenue, £4,108; expenditure, £9,771.

Endowments.

Owing to the far-sightedness of the first Chairman of the Board, Captain W. C. Daldy, the Board was endowed by the Provincial Government with large areas of the bed of the harbour, amounting in all to over 5,000 acres. Of this, about 280 acres on the foreshore of the city has been reclaimed by the Board. The General Government has resumed for railway and other purposes a large portion, but the balance, amounting to 108 acres, has been roaded, and is either leased or available for leasing. The revenue derived from this land, much of which comprises the business portion of the city, has materially assisted the Board in carrying out its scheme of harbour improvements.

There is still available for leasing about two acres of Freeman's Bay Reclamation, about 20 acres of the Eastern Reclamation, and about 13 acres of the Western Reclamation; also a number of sections on the waterfront, being land reclaimed through the filling in of the Auckland Dock. These are suitable either for warehouses, factories, or ship-building sites.

Harbour Improvements.

In 1904, the Board, acting on the advice of its Engineer, Mr. W. H. Hamer, M. Inst. C.E., adopted a scheme of Harbour Works which entailed complete revision of the berthing accommodation, and commenced work at once. The destruction of timber in the waters of the Auckland Harbour by marine pests had long been such as to entail heavy expenditure for maintenance and renewal. The Board therefore approved a policy of permanent construction, and has since built in concrete—either plain or reinforced—and this has solved the difficult problem.

The scheme of works for Auckland Harbour provided for a series of wharves covering about two miles of the City frontage and enclosed within tide deflectors on the East and West. This involved the deepening of the berths to make them available for the largest cargo and passenger steamers visiting the Dominion and the reclaiming with the spoil of large areas, which would be available for leasing. This scheme has been the basis of all the Board's work ever since, though it has been modified to some extent in accordance with recommendations made in 1925 by the present Engineer, Mr. Drummond Holderness, M. Inst. C.E.

The King's Wharf was the first work to be taken in hand, and this was completed in 1908. The Queen's Wharf and the Ferries were next begun; and Northern Wharf and a portion of Quay Street Landing followed. Simultaneously concrete retaining walls were made at Freeman's Bay, where an area of about 70 acres was reclaimed. On the Northern side of the harbour a very heavy construction was called for in connection with the Admiralty agreements for the sheer-legs and wharf berthage. New concrete wharves for the trans-harbour ferry traffic were also built at Birkenhead, Bayswater and Devonport. The Quay Street Landings were completed, and Central Wharf was built to a distance of 850 ft. Western Wharf (off Freeman's Bay Reclamation) 1,540 ft. long, was completed, and Prince's Wharf (a fine ferro-concrete structure, with six two-storey sheds), was begun in 1921 and completed three years later. New landings were provided for the trans-harbour vehicular service.

Harbour Board's 600-ton Slipway. Auxiliary Schooner "Huia" and A.H.B. Tug "Te Awhina" on Slipway.

The Harbours of Auckland, New Zealand—*continued*

A feature of the main wharves is that they may be conveniently extended in deep water if shipping developments should call for this.

The extensive dredging operations of recent years have provided adequate depth of water for the deepest draught vessels, and this can be further improved whenever required.

After Mr. Hamer's retirement in 1925, his successor, Mr. D. Holderness, M. Inst. C.E., recommended certain alterations to the scheme, and these were approved by the Board. The new scheme provides for possible development during the next 25 or 30 years and involves an estimated expenditure of £5,500,000. (See Supplement).

The Board has already spent about £4,000,000 on its works, and has in contemplation the provision of additional wharves and reclamations as the need grows.

Prince's Wharf, Roof Cranes.

Manukau Harbour

The Auckland Harbour Board took over control of the Manukau Harbour on 20th July, 1913.

Description.

Manukau Harbour is an extensive inlet on the West Coast, opposite to Auckland, having a water area of approximately 152 square miles, and a harbour frontage of 240 miles. It gives water communication to Onehunga, Waiuku, and other inland towns. By means of this inlet, Auckland enjoys rapid communication with Taranaki, Wellington, Nelson, and all the ports on the western coasts. It is a bar harbour, but has seldom less than 3¼ fathoms in the channel at L.W.S.T.

Onehunga, the largest borough on the shores of the Manukau, has about 11,000 inhabitants, and is connected with Auckland by road, railway, and electric tramway. Near to it are the large meat-freezing works of the Auckland Farmers' Freezing Co. and the Westfield Freezing Co.; also the fertilizer works of Messrs. Kempthorne, Prosser and Co., and the Farmers' Fertilizer Co.; and other large factories and mills. On the south-western reach of the harbour is Waiuku, a flourishing township; and at the end of the north-eastern reach is the Borough of Otahuhu. Very narrow and low-lying isthmuses separate the Manukau from Auckland Harbour, both at Otahuhu (1,000 yards wide, with a maximum height of 38 ft.), and at Karaka Bay (1⅛ miles, and a maximum height of 126 ft.). At Waiuku a similar low isthmus separates the harbour from the Waikato River, which is navigable as far as Cambridge, with many tributaries available for many miles for launch traffic, and reaching far into the heart of the Province.

The canalisation of these isthmuses so as to give direct communication by water from Auckland and Onehunga has been pressed forward as an important addition to the transport facilities of the Province, and has been favourably reported upon by the Inland Waterways Commission set up by the Government.

Geographical Position.

Paratutai, Manukau North Head, lat. 37 deg. 2 mins. 48.5 secs. S., long. 174 deg 30 mins. 45 secs. E.

Entrance.

The Heads are easily distinguished, the coast gradually increasing in elevation from Kaipara to Manukau, where the hills on the north shore rise to a height of 1,300 ft. North of the port the country is an extensive forest, while all that facing seaward to the southward is peculiarly barren for 20 miles; but the most conspicuous objects first visible from the westward are the conical peaks near the North Head. One of these forms the island Paratutai, and may be considered as North Head, being connected by a causeway; it is elevated 355 ft. above the sea. South Head presents a rounded, barren face of brown sandy soil, with tableland extending southward.

Main Channel.

The bar, about four miles from the entrance, is about a mile in width, with a depth of 3¾ fathoms.

Shipping.

The shipping arrivals for 1934 consisted of:—232 vessels—62,243 gross tons, 30,897 net tons.

Wharves.

The wharf at Onehunga is of ferro-concrete and is owned and administered by the Harbour Board. It is connected with the railway service of the Dominion, and vessels can load or unload directly from or into railway trucks. It is provided with two goods sheds.

Wharves and landing places are also provided at the various settlements round the harbour.

Imports and Exports.

The imports into Manukau during 1934 amounted to 14,242 tons, and the exports to 30,232 tons. The intra-harbour traffic amounted to 24,903 tons—a total of 69,377 tons.

Endowments.

At Manukau Harbour the Board's endowments consist of some 1,700 acres of land at Manukau Heads and at other points around the harbour, most of which is leased. A large part of this is covered with virgin forest in which are many young kauri and other native trees. Besides this, the Board owns the foreshore and mud flats in the harbour, totalling thousands of acres.

Bombay Port Trust

At a meeting of the Trustees of the Port of Bombay held on 7th April, 1936, the following were the main items of business disposed of:—

A letter was read from the Honourable Mr. Hoosenally Rahimtoola resigning his seat on the Board, and the Trustees passed a resolution of congratulation on his election as President of the Bombay Legislative Council, and of appreciation of his valuable services to the port during his five years' tenure of office as a Municipal representative on the Board.

Mr. G. Wiles, Chairman, was re-elected to represent the Port Trust on the Advisory Committee of the G.I.P. Railway for a term of two years.

Mr. C. N. Rich, Docks Manager, was granted leave preparatory to retirement with effect from 6th July, 1936, and Mr. F. A. Borissow, Deputy-Manager, was appointd to act as Docks Manager, subject to the sanction of Government.

Consequent on the Trustees' decision to convert the hopper barges "Spotbill" and "Widgeon" into drag suction dredgers, bucket ladder dredging in the docks and harbour is being entirely superseded by the more economical method of drag suction. In addition to the substantially lower working costs, an annual saving of Rs.31,000 is being effected in the cost of dredging staff. To give effect to this, the Board sanctioned a revision of the dredging establishment.

Minor items of expediture were sanctioned for extending the Ferry Steamer Wharf in order to accommodate the larger vessels now berthing at the wharf, and for an investigation into the extent of lead-poisoning, if any, amongst workmen employed in scraping and painting vessels in the dry docks.

Amendments were approved, subject to the sanction of Government, of the Docks Scale of Rates classifying soapstone in crude or crushed form for purposes of wharfage at the lower rate applicable to Talc, and of the Chain Testing House Regulations in respect of charges for testing and welding chains. A reduced rate of 8 annas per 5 bales for the carriage of cotton from the Cotton Depot to the docks, including loading at the depot and unloading at the docks, was also introduced into the B.P.T. Railway Goods Tariff.

Grab Dredger for the River Trent

AN interesting grab dredger, the "Panurgic," which is illustrated on this page, has just been delivered by Priestman Brothers, Ltd., to the River Trent Catchment Board.

This dredger has been ordered for general purpose dredging on the lower reaches of the River Trent, but its primary duty is to carry stone and chalk to various sites on the river where the dredger will be employed for digging trenches in the toe of the bank and re-filling these trenches with stone for the prevention of slipping and erosion, the grab dredger being used for both digging the trench and unloading the stone from the hold and depositing it in the trench.

It is also arranged so that at any time it can be adapted for pile driving and in addition, the dredging crane itself, is designed for handling loads up to 5 tons in weight.

The dimensions of the vessel are 90 ft. by 21 ft. by 7 ft. and it has a hold capable of carrying 100 tons of stone, placed approximately amidships. The dredging crane, which is of Messrs. Priestman's No. 18 size, is driven by a Diesel engine, an auxiliary petrol engine being provided for starting the main engine and a heavy plate grab of 25/19 cubic feet capacity is operated at radii varying from 32 ft. 6 in. to 18 ft.

The vessel is propelled by a 60 h.p. Widdop engine giving a speed loaded of 6 to 7 miles per hour, and the draft being limited to 5 ft. 6 in., the vessel is able to manœuvre in almost any part of the river at all stages of the tide.

Sleeping accommodation is provided for the crew on board and in addition a special cabin is arranged for the use of the chief engineer and his staff.

The hull, which has many interesting characteristics, was built to the design of Messrs. Priestman Brothers, Ltd., by Messrs. J. S. Watson (Gainsborough), Ltd., under the supervision of the Chief Engineer of the Catchment Board, Mr. W. H. Haile, M.Inst.C.E.

Port of Ghent.

During the month of March, 1936, 176 vessels with a net registered tonnage of 166,247 entered the Port of Ghent, as compared with 168 vessels of 165,302 n.r.t. during the corresponding month of 1935.

For the first three months of the year 542 vessels of 558,355 n.r.t. entered the port, as compared with 461 vessels of 474,377 n.r.t. in the corresponding period of 1935. There has therefore been an increase of 81 vessels and 83,978 n.r.t.

The "Mar" Year Book.

The 5th edition of the "Mar" Year Book or River Plate Shipping Manual for 1936, has just been published. The book, which has been thoroughly revised, deals very concisely with shipping regulations and maritime matters, including charges and tariffs in the Argentine and Uruguayan Ports.

A considerable amount of additional information has been included in tthe 1936 issue, and this includes:—Aerial views of the Port of Buenos Aires; plans of the Port of Concepcion del Uruguay, Mar del Plata, San Lorenzo and Fray Bentos; new map of the River Parana; day and night Tidal Signals at Martin Garcia and tables of useful information.

The "Mar" Year Book can be obtained from Editorial Mar, Casilla de Correo 1080, Buenos Aires, or from any Steamship Agent established in the River Plate, at a cost of 9s., post free.

The Port of Karachi.

In the month of January, 1936, 78 vessels with a net registered tonnage of 206,178 entered the Port of Karachi, and 77 vessels cleared of 197,632 n.r.t. The number of vessels which entered and cleared during January, 1935, were:—Entered, 81 vessels of 203,378 n.r.t., and cleared 87 vessels of 231,315 n.r.t.

For the ten months ending January, 1936, the number of vessels entering the Port of Karachi amounted to 749 with a net registered tonnage of 1,975,284, and the clearances amounted to 744 vessels of 1,961,704 n.r.t. During the ten months ending January, 1935, 745 vessels entered of 1,937,603 n.r.t., and 748 vessels cleared of 1,952,121 n.r.t. These figures do not included country craft.

The amount of cargo handled in January, 1936, was:—Imports 62,503 tons, and exports 88,552 tons, a total of 151,055 tons of imports and exports. In the month of January, 1935, 84,080 tons of imports and 92,590 tons of exports were handled, a total of 176,670 tons. For the ten months ending January, 1936, the total quantity of imports and exports handled was 1,519,370 tons, made up of imports, 687,711 tons, and exports, 831,659 tons. During the ten months ending January, 1935, the quantity of imports and exports handled amounted to 1,663,617 tons; imports accounted for 654,636 tons and exports 1,008,981 tons.

Hull and the East Coast

Contemplated Improvements at Victoria Dock, Hull.

IN order to remove the causes of congestion which has been an almost regular feature of the timber importing season at Hull, the directors of the London & North Eastern Railway have under consideration plans for improving the Victoria Dock, which when carried out will involve an expenditure of £150,000. It is proposed to provide four more discharging berths by the removal of existing sheds on the Humber side of the dock at present used by vessels engaged in the Hull-Danzig trade to the opposite side of the dock where the wooden staging would provide a liner berth. It is also proposed to fill in the timber pond to provide more storage ground and for the accommodation of loaded bogies. As already reported, permanent stagings for use during the discharge of timber-laden vessels are to be made available. The merchants' yards on the Citadel Estate are to be relaid where there is not easy access for wagons and empty bogies, and 600 additional bogies are to be brought into use. The scheme has been very cordially received by timber importers and shipowners, who hope that a serious effort will be made to carry out the proposed improvements in readiness for the busy period of the season due to commence very soon. A point of difficulty has arisen, however, in that the dock owners, the London & North Eastern Railway, desire that in return for carrying out the improvements the bulk of the traffic at the Victoria Dock destined inland should be sent by rail. The company submit that they cannot undertake the heavy expenditure involved and continue to allow road hauliers to take about 50 per cent. of the traffic, and they intimate that they will not lease yards on the dock to firms who will not come into an agreed scheme. A representative committee of the timber interests has been formed to enter into negotiations with the London & North Eastern representatives in the hope that an amicable arrangement will be come to. Many individual firms of timber importers, however, regard the situation with great concern and especially those who own motor vehicles. By some it is described as " a disguised form of attack " on the road transport industry and it is contended that if the proposal is made operative the reaction on the port of Hull would prove disastrous. Moreover, the effects would also be felt by inland timber merchants and the building trade generally. Delays in transit would be inevitable, congestion in railway yards serious, and, owing to the additional cost of transport of timber from the nearest goods yard to destination —often many miles from the yard—additional charges to the builder would be involved. At the meeting of the Hull Chamber of Commerce and Shipping, when a discussion took place on the proposals of the Railway Company, the question was raised as to how far imports other than timber might be affected. Mr. J. H. Fisher said that he was not keen on road transport, but he felt that it would be very detrimental to the trade of the port were motor vehicles not allowed to go on the docks for timber except under severe restrictions. The whole matter, however, is in abeyance pending the outcome of the negotiations which are in progress.

Humber Ferry Traffic.

Work in connection with the construction of a new landing stage and floating pontoon at Hull for the better accommodation of the Humber ferry traffic is proceeding under contract. In January the City Engineer reported that the work appeared to be in arrears of schedule, but in a subsequent report stated that reasonable progress had been made in the meantime. The amount of the contract is £38,647. Notice to commence the work was given on September 16, 1935, and the time allowed for completion was 14 months. With regard to the reconstruction of the Victoria Pier, which is being done by the City Engineer at an estimated cost of £5,953, it is anticipated that the work will be completed any time now providing weather conditions are favourable.

Trade at Hull and other Humber Ports.

The export trade in coal from Hull and the other Humber ports continues to suffer. The total of exports, foreign, for the first quarter of the year was only 630,176 tons, as compared with 816,127 tons in the corresponding January-March period of 1935. A contributory factor in the reduction was the extreme scarcity of coal during the weeks that labour troubles in South Yorkshire threatened and the inability of collieries to quote or guarantee supplies for forward delivery. The pressure from inland industries is not so great now, but prices, etc., are operating against a revival of demand. Shipments of bunker coal are about maintained, but generally speaking, the first-class facilities for the handling of coal at the Hull Docks are utilised to only about 50 per cent. of capacity, or even less. There was, however, a good increase of 105,000 tons in the imports of wheat and kindred cereals during the quarter, though oilseeds, nuts and kernels were 35,000 tons down. Petroleum imports showed some decline, but timber and some other articles recorded increases.

Increase in Iron Ore Imports at Immingham.

In connection with the iron and steel industry in North Lincolnshire there have been increased imports of iron ore at Immingham Dock and to facilitate discharge the London and North-Eastern Railway directors have decided to provide four additional grabs for the unloading of ore. There are already two 30-cwt. grabs at the dock and the new ones will be of a similar type. With six grabs working it will be possible to discharge all the holds of a vessel in one berth and the two largest holds of a ship in the adjoining berth simultaneously. Production of steel in North Lincolnshire is proceeding at an enormous rate, the total last year exceeding a million tons.

Good Year for Aire and Calder Navigation.

The report of the Aire and Calder Navigation, which has large interests in the Port of Goole and the West Riding of Yorkshire, states that the improvement noted in 1934 was fully maintained in 1935. The transport of coal, coke, pitch and burnt ore increased by 54,256 tons. Traffic carried by bye-traders over the waterway increased by 66,882 tons petroleum spirit and fuel oil by 13,442 tons and general merchandise by 9,397 tons. The anti-coal-breakage appliance fitted to No. 5 boat hoist at Goole proved a marked success, the tonnage passed through it being 163,179 tons. A further anti-coal-breakage appliance is being attached to No. 3 boat hoist. Satisfactory progress, it is reported, is being made with the new entrance lock at Goole and work is expected to be completed in August next. The report also states that the Trent Falls Improvement Works have been completed at a cost of £189,606, of which £116,000 was contributed by the Humber Conservancy Board. These works, it is added, have already had a marked effect upon the channels of the Lower Ouse. The electrification of repair shops at Stanley Ferry, near Wakefield, and the replacement of steam cranes at Hunslet and Goodman Street Wharves by up-to-date electric cranes have been completed and a new transit shed at the New Dock, Leeds, is in course of erection and is intended to deal principally with the oil traffic. The accounts of the Aire and Calder Navigation show that the revenue for the year was £154,458, as against £153,295 in 1934, and that the dividend of 4½ per cent. on the ordinary shares is the same. £10,000 is placed to reserve, £9,390 provided for works and plant replacement, and £61,147 is carried forward.

Port of London Notes

London's Shipping.

During the week ended 27th March, 998 vessels, representing 925,971 net register tons, used the Port of London. Of these, 481 vessels (686,663 net register tons) were to and from Empire and Foreign ports and 517 vessels (239,308 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended 3rd April, 1,245 vessels, representing 999,404 net register tons, used the Port of London. Of these, 516 vessels (762,501 net register tons) were to and from Empire and Foreign ports and 729 vessels (236,903 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended 9th April, 1,085 vessels, representing 922,483 net register tons, used the Port of London. Of these, 435 vessels (719,657 net register tons) were to and from Empire and Foreign ports and 650 vessels (202,826 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended 17th April, 1,026 vessels, representing 1,024,612 net register tons, used the Port of London. Of these, 526 vessels (814,969 net register tons) were to and from Empire and Foreign ports and 500 vessels (209,643 net register tons) were engaged in coastwise traffic.

Tilbury Passenger Landing Stage.

Forty-four vessels, totalling 420,184 gross register tons, used the Tilbury Passenger Landing Stage during the month of March.

Port of Algiers: The Mustapha Jetty—III

By M. PIERRE J. M. RENAUD, Ingénieur en chef des Ponts et Chaussees, Director of the Port

(concluded from page 140, March issue)

III—Surveys, etc. (continued)

B.—MEASUREMENTS (continued).

b. Reduced Scale Experiments.

APART from measurements of full-size works at the actual jetty, many investigations have been undertaken in the Port of Algiers in the way of experiments and measurements on models of reduced scale, with the object of seeking to verify theoretical formulæ devised by various engineers for the calculation of the stability of vertical-faced breakwaters.

These reduced scale experiments have been carried out with the collaboration of M. Larras, engineer of the Ponts et Chaussées at Algiers and, as regards certain controlling tests, with the assistance of the hydraulic laboratory of Lausanne University, under the direction of M. Stucky.

The experiments can be classed in two groups. In one of these an attempt has been made, by the application of the law of similitude to verify formulæ for the computation of pressures. In the second group, undertaken after the serious accident to the Mustapha Jetty, the main object in view has been to determine the behaviour of natural bottoms at the foot of vertical breakwaters, in order to check the various theories advanced upon the cause of the disaster.

(i) Investigation of Pressures on Scale Models.

Experimenting with reduced models seeks not only to verify formulæ, but also to ascertain the effect of certain factors in construction, such as the level of wall foundations, the width of berm, the slope of rubble foundation mounds; factors which the requirements of mathematical analysis exclude from direct incorporation in the framing of formulæ, as has been already remarked when considering how to arrive at the depth of water to be assumed in calculations.

A first series of trials was begun in Algiers, employing a rectangular trough 6 m. long, 40 cm. wide and 80 cm. deep. At one end of this trough was the model of the jetty under examination, reduced to 1/37½ of full size, in which was placed the appliance for measuring wave pressure. This consisted of a simple vertical sheet of rubber 10 mm. thick, whose external dry face carried nine small concave mirrors placed one above the other in a vertical line and illuminated by a suitable lamp, placed about one metre behind the trough.

The setting of this arrangement was rendered easy by varying the level of water at rest in the trough, the forces of inertia and hysteresis are negligible.

The wave action was produced by means of a paddle set in motion, at the end of the trough farthest from the model jetty, by an operator who timed his movements regularly by following the beats of a conveniently-placed metronome.

The results have been plotted on graphs, which also show the calculated pressures (Fig. 36).

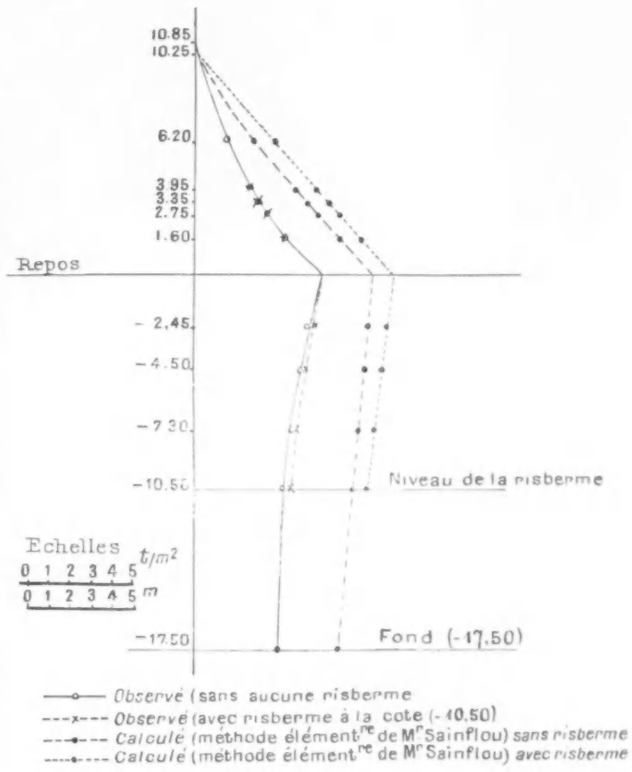


Fig. 36. Observations on model to scale of 1:37½, in the Algiers laboratory. (*H*=17·5m. 2*L*=225m. 2*h*=7·5m.)

Similar experiments, to furnish a check upon these, were made at the Author's request, by the hydraulic laboratory of the University of Lausanne (Fig. 37).

The measured pressures in general are smaller than the pressures calculated by the hydro-dynamic method. Yet in certain cases a 50 per cent. increase in the forces is observed, both at the surface and lower down; but this does not occur except when, for one reason or another, the period of oscillation imparted to the water in the model fails to coincide with the true wave period; then there arises a sort of single violent wave, which adds its force of impact to the pressures due to the standing wave. This explains the observation of pressures higher than average under the same conditions of swell.

The form of the base mound has very little influence upon the magnitude of the forces, except that when such mounds are large there is a tendency for pressures to be increased, as indicated by theory. It should be noted that the formulæ based upon classic principles of hydrodynamics are those which show the least variation to arise from differences of depth—and consequently minimise the influence of the form of base mound.

As typical examples, the tables below show the results of a series of experiments made at Lausanne upon a small model of the Mustapha Jetty, in comparison with values computed according to theory, in the two hypothetical cases following, viz.:—

2 h = 5 metres.	2 h = 9 metres.
2 L = 80 metres.	2 L = 150 metres.
2 T = 7.6 seconds.	2 T = 11.9 seconds.

The comparative calculations assumed the two extreme conditions, firstly, of a wall carried down vertically to the full depth of a natural bottom 20 metres down, and, secondly, of a shallower wall standing on a base mound with a berm 8 metres wide at a depth of 13 metres and with a slope 1—to—1. Furthermore, calculations were made by the two alternative methods: the hydro-dynamic of M. Sainflou and the dynamo-static of M. Jorge Lira.

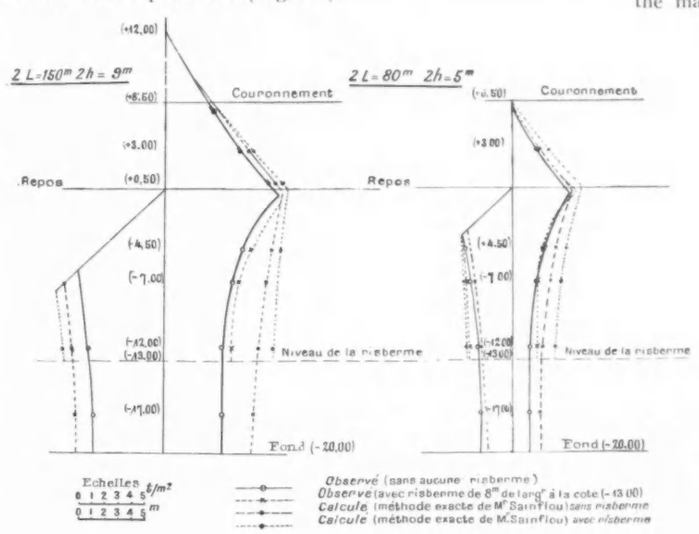

2 L=150m 2h = 9m
Couronnement
Repos
Niveau de la risberme
Fond (-20.00)
2 L=80m 2h=5m
Couronnement
Repos
Niveau de la risberme
Fond (-20.00)
Echelles t/m²
0 1 2 3 4 5
0 1 2 3 4 5 m
Observé (sans aucune risberme)
Observé (avec risberme de 8m de larg.r à la cote (-13.00)
Calculé (méthode exacte de Mr Sainflou) sans risberme
Calculé (méthode exacte de M. Sainflou) avec risberme

Fig. 37. Observed pressures on model. Experiments at Lausanne laboratory.

Port of Algiers—continued

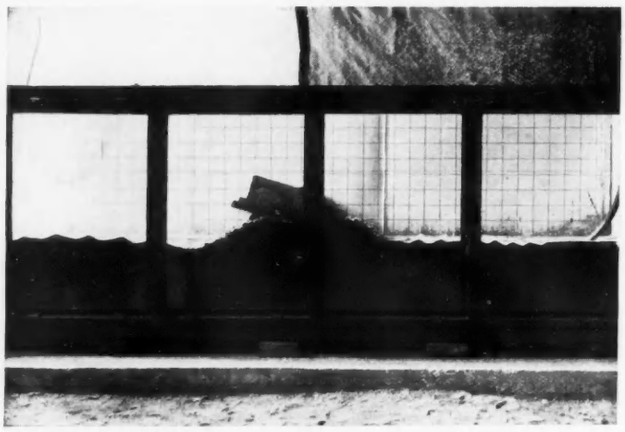


Fig. 38. Model, to scale of 1:50, of the Algiers jetty.
Photograph showing the jetty overturning towards the sea, through undermining, erosion and impact on the base.

First Hypothesis: 2 h = 5 m., 2 L = 80 m.

Levels of Observations	Pressure, in tons per sq. metre: Calculated by hydro-dynamic method H = 13m.	Calculated by hydro-dynamic method H = 20m.	Calculated by dynamo-static method H = 13m.	Calculated by dynamo-static method H = 20m.	Observed on small-scale model of jetty Experiment at Lausanne
Crest of standing wave or "clapotis"	0	0	1·60	1·06	0
Sea level	5·26	4·60	4·35	3·74	5·00
At depth of 4·5m.	4·10	3·30	4·00	3·59	2·25
,, ,, 7m.	3·70	2·90	3·54	3·40	2·00
,, ,, 12m.	3·25	2·25	3·08	3·20	1·9
,, ,, 17m.	11·00	2·10	—	—	1·85

Second Hypothesis: 2 h = 9 m., 2 L = 150 m.

Levels of Observations	Pressure, in tons per sq. metre: Calculated by hydro-dynamic method H = 13m.	Calculated by hydro-dynamic method H = 20m.	Calculated by dynamo-static method H = 13m.	Calculated by dynamo-static method H = 20m.	Observed on small-scale model of jetty Experiment at Lausanne
Crest of standing wave or "clapotis"	0	0	5·44	2·45	0
Sea level	9·25	9·00	11·51	7·69	8·80
At depth of 4·5m.	8·70	8·10	10·32	7·36	6·50
,, ,, 7m.	8·55	7·70	8·75	6·93	5·60
,, ,, 12m.	8·25	7·20	7·19	6·49	5·10
,, ,, 17m.	—	6·80	—	—	4·50

The observed pressures, especially near the base of the wall, prove to be lower than the values calculated by various methods. The manner of variation in pressure is very similar to prediction. The difference between theory and the result of experiments on models is substantially the same at Lausanne as at Algiers, but is greater than in the case of full-size walls and the "quartz" recording instruments, which may be due to the methods of measurement, whose sensitiveness calls for some co-efficient of correction.

(ii) Investigation, with reduced model, of Conditions of Stability of Sea-bed Formations and of Foundation Mounds.

Though a knowledge of the pressures upon walls in themselves is of prime importance in considering the stability of breakwater walls which have to resist overturning and shearing forces, yet it is hardly less necessary to investigate the behaviour of the sea bed and of substructures.

The Cairo Congress (the 14th Meeting of the International Navigation Congress Association held at Cairo in 1926) reached the following conclusion:—

"In the case of vertical-faced breakwaters, it is especially the extent in area of the apron or rubble substructure, its protection at the toe of the wall and the form of its forward slope that call for particular consideration with a view to preventing the destruction of the work by undermining or scouring away of the sea bed or of the foundation and transforming the swell into breaking waves."

But as the final phrase of this conclusion indicates, it was not supposed at that time that scouring could occur with a depth of water of about 20 metres, a depth in which waves do not break even in the severest storms. This latter fact was demonstrated most clearly during the storm of 3rd February, 1934, at Algiers, where, nevertheless, the characteristics of the rolling swell exceeded anything previously observed in the Mediterranean, even at ports having the most open exposure. (See photographs Nos. 15 and 18).

No doubt accidents such as that in which the jetty at Valencia was carried away for a length of nearly 200 metres on 27th December, 1926, shortly after the Cairo Congress, might be attributed to an insufficient depth of the foundation level. The wall, in fact, was only taken down to a depth of

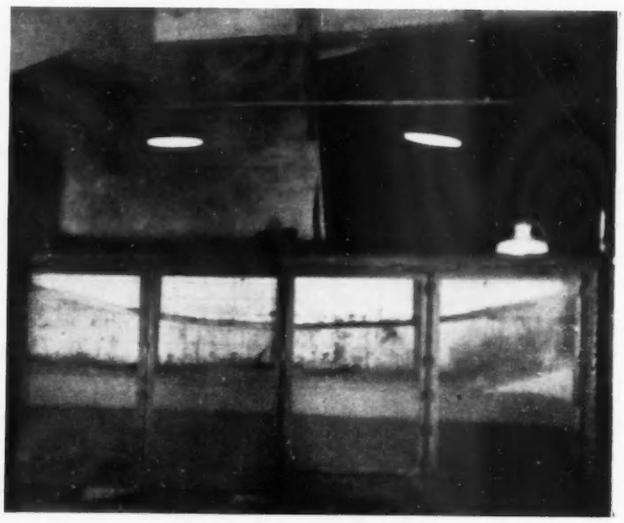


Fig. 40. Model, to scale of 1:50.
Section of a film showing the movement of sand on the bottom. The "clapotis" is at its highest level against the breakwater on the right and at its minimum at a half wave-length away.

10 metres, while the foundation was on a mud bottom at a ruling depth of about 12 metres, nowhere exceeding 14 metres below zero of charts.

But it had appeared, judging by the examples of Catania, Genoa and Algiers, that sandy bottoms, under about 20 metres of water, were practically immune from scour, the sea bed holding well even in 15 metres at Genoa, although the storms experienced there are reckoned to be very violent.

The damage sustained by the Catania jetty on 26th February, 1930, and 26th March, 1933, moreover, seemed to confirm this opinion, the failures in question being essentially due to insufficient resistance of the wall, principally to shearing action.

It is true that a slight hollowing of the bottom, about 30 metres wide and 1½ metres deep, had occurred in 1930 at Catania, in front of the rubble foundation mound, but so far as is known, no such depression (however little importance it might have) had been observed in 1933, and its occurrence in 1930 had seemed attributable, at least in some measure, to the breaking of heavy seas over the ruins of the work. The storms that attacked the Mustapha Jetty, especially those of 1930 and 1933, had not caused erosion of this sort, though the sand of the Bay of Algiers is very silty and of practically the same granular size as that of Genoa and Catania.

The disaster at Algiers on 3rd February, 1934, entirely attributable to undermining, led to the undertaking of a quite extensive series of experiments upon the behaviour of sea bottom formations.

These experiments were carried out in the laboratory of the Port of Algiers, employing a large trough, to a scale of one-fiftieth of full size, measuring 20 metres long, 50 centimetres wide and 1½ metres deep, the sea bottom being represented by a layer, 50 centimetres thick, of very fine sand, the rubble foundation mound being represented by gravels of suitable

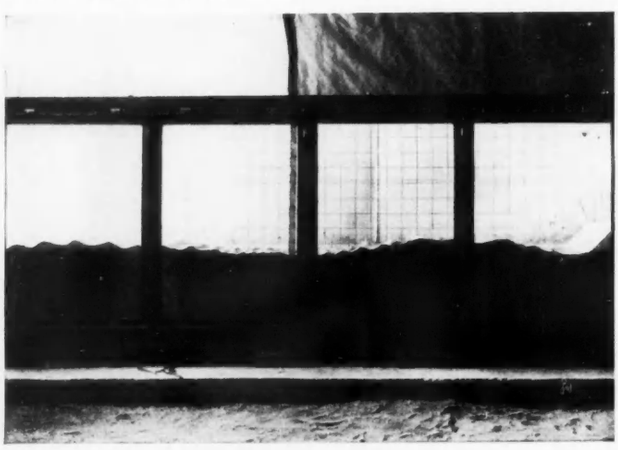


Fig. 39. Model, to scale of 1:50.
Photograph showing the formation, after settlement, of ridges at ½ and ¾ of wave-length and furrows at ½ wave-length and multiples.

Port of Algiers—continued

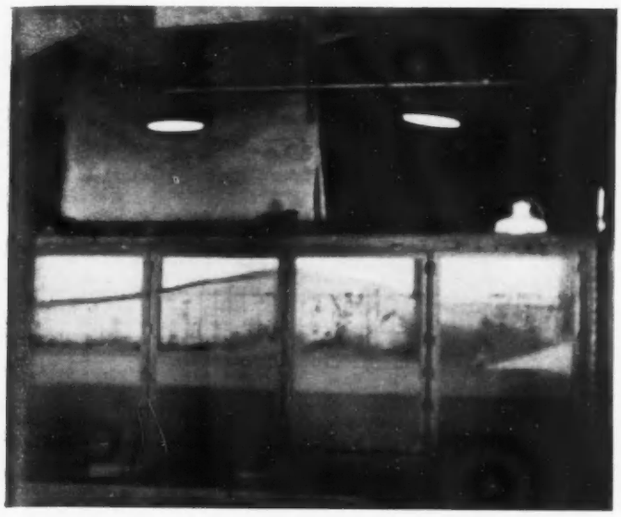


Fig. 41. Model, to scale of 1:50.
Section of a film showing the movement of sand on the bottom. The "clapotis" is at its lowest level against the breakwater and its maximum at a half wave-length away.

gauge and the jetty being built to the same scale in cement mortar.

Wave movement was simulated by means of an arrangement of mechanism such as to insure proportionality of impulses, following Gerstner's law: the reproduction of the physical features of the storm induced the beating of waves against the jetty: a small pump served to preserve the proper water level in the part of the model which represented the inside of the harbour.

The result of these experiments has been very clear:—

(a) The wall hammers on its foundation, according to theory, but if, for storms such as those of 3rd February, 1934, at Algiers (whose characteristics were:—2 L=200 m., 2 h=9 m., 2 T=14 secs.), its width is enough to prevent immediate overturning—as is the case with widths of about 13 metres, like the Mustapha Jetty—the fall takes place towards the seaward side. (See Fig. 38).

(b) The recoil at the toe of the wall tends to drive the protection blocks outwards and it blunts the angle of the berm, gradually flattening the slope of the rubble bank, from which the finer material is readily sucked out by the sea at the moment when the "clapotis" is at its lowest level.

For this reason it is desirable to combine the base blocks and the protection blocks in a single mass, setting the structure upon a slab of reinforced concrete, which, moreover, ensures a much better distribution of the jetty loading over the substructure.

(c) The base of the rubble bank settles gradually, and there occurs a slow consolidation of this bank, which is progressively lowered, and thus, under the influence of the hammering action, encourages the forward tilting of the wall. It goes without saying, that the steeper the slope of the bank, the more pronounced is this effect: in this respect intuition is confirmed by experiment.

(d) Independently of the depression which always forms at the foot of the mound, whatever its position, other phenomena of great complexity are found to affect the bottom, especially at a point corresponding to one quarter of the wave-length. At this point the bottom velocities are certainly at a maximum, conformably with theory, but, owing to the alternating direction of the horizontal movement, there is found to be not a hollowing effect but rather an emulsifying effect, sand being held in suspension during the disturbance and then, when calm is restored, being deposited at the quarter wave-length and forming there not a furrow but a ridge. (See Fig. 39).

Calculation, moreover, might lead to expectation of this result. In fact, according to formulæ for calculation, the pressure varies and movement alternates, in upward and downward direction, at multiples of the half-wave-length, whereas at the quarter and three-quarter lengths the pressure at the bottom is constant.

The variations of pressure inevitably give rise to ascending currents, which calculation predicts and experiment proves beyond question to occur.

The table hereunder indicates the magnitude of these pressure variations in terms of head of water.

Pressures	At 20 metres depth 2h.=5m. 2L=80m. Worst storm foreseen	2h.=9m. 2L=200m. Worst storm observed	2h.=13 1/2m. 2L=300m. Scale model experiments in scour
Maximum	21·95	27·49	31·10
Minimum	18·05	12.51	9·90
Difference	3·90	14·98	21·20

Tons per square metre

It is abundantly evident that such variations of pressure, being more than four times what could be forecast, according to earlier observations of the severity of storms at Algiers, could not fail to occasion disturbance in the fine sand of the bottom.

This phenomenon, of which cinematograph views were taken (Figs. 40 and 41) may be compared with the classic laboratory experiments upon the formation of ripples or ridges in any

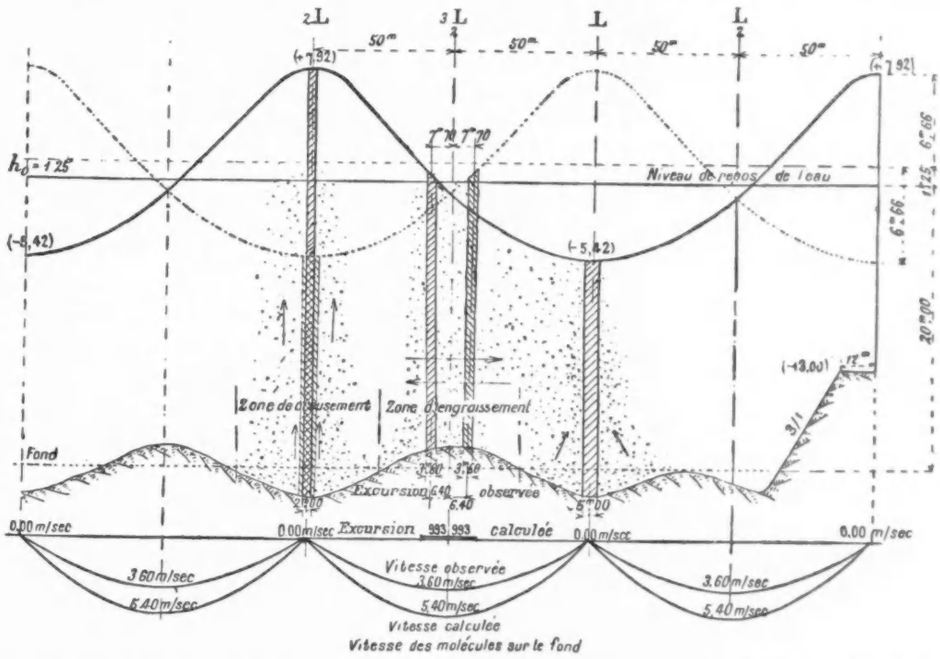


Fig. 42a. Mechanics of the accretion and erosion of sandy bottom. At ¼ and ¾ wave-length, the bottom velocities and horizontal movement of particles are at a maximum, while the variations of level are practically nil. At multiples of half wave-length, the bottom velocities are at minimum, and the variations of level at maximum. At the latter points, hollowing currents occur, which erode the bottom and put in suspension particles of sand which gradually settle at the points of ¼ and ¾ wave-length, where on the contrary, ascending currents do not occur, but the sand is subject only to currents to and fro horizontally.

Port of Algiers—continued

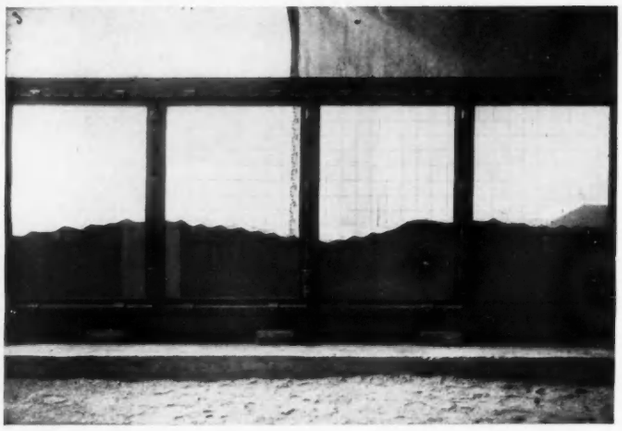


Fig. 43. Model, to scale of 1:50.
Photograph showing the effect of a fascine mattress, 35 metres wide, in front of the foundation mound.

granular substance when subjected to oscillatory movement of the liquid above it: such ripples forming very distinctly, commencing at the points where the greatest horizontal movement of the liquid occurs.

(e) The extension of the slope tends to cause a change in position of the ridges and furrows which appear on the bottom after settlement, the spacing of these ridges and furrows remaining equal to half a wave-length, the first depression occurs at about half a wave-length from the face of the wall. The amplitude or vertical range of the ridges and hollows is, moreover, greater when the slopes are steeper. This fact, coupled with that noted under head (c) about the depression at the toe of the slope, fortifies the opinion previously expressed in favour of wide berms and flat slopes. (See Fig. 42).

(f) The laying of a protective apron or mattress over the sea-bed (fascines weighted down with rubble) naturally prevents scouring at the toe of the bank and reduces to an enormous extent the settlement of the bank, which remains practically stable if its slope is less than 1-in-2. But then a depression forms at the seaward edge of the mattress, and the ridges and furrows form beyond it, as if advanced to an extent corresponding with its width. This is intelligible if it is remembered that the edge of the mattress constitutes a line of commencement for the furrows, which must form at regular intervals depending only on the frequency and amplitude of the movement and the depth of the water. (See Figs. 43 and 44).

This very interesting experiment proves the effectiveness of a mattress of fascines at the toe of the rubble mound substructure when the bottom is not very deep, and if its sandy nature—the usual case—gives cause to fear the occurrence of scour at times of severe storm.

The fascines offer the great advantage of preventing the penetration of the rubble into the sandy bottom and thus reducing the consumption of materials, which in consequence can be of a size sufficient to ensure their stability. The fascines serve further to reduce the thickness of the foundation, and consequently to diminish as much as possible the force of wave pressure by offering the least obstacle to the formation of the clapotis and keeping the depth in front of the structure at a low level.

It must be admitted that these experiments on reduced scale models incur the classic reproach of the impossibility of ensuring a faithful co-ordination of all elements and all forces. The sand grains are proportionately too large; yet greater fineness, if feasible, would introduce surface tensions falsifying the comparison: the rubble stones, if represented exactly to scale, have a surface area too great for their weight, and their stability is thereby diminished.

Nevertheless, it must be recognised that these experiments do clearly indicate results in a qualitative sense and confirm opinions founded upon observation of the actual structures.

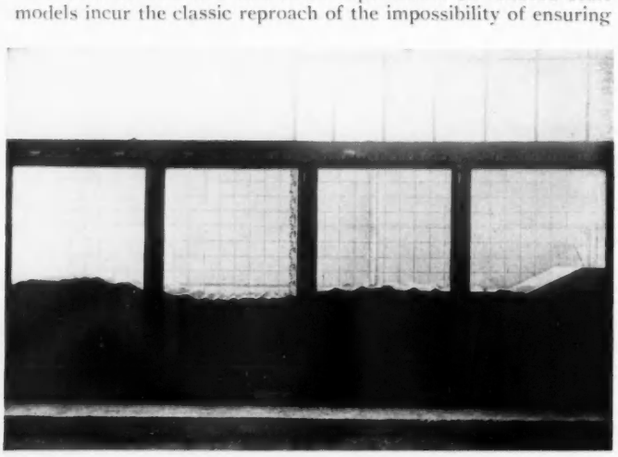


Fig. 44. Model, to scale of 1:50.
Photograph showing the effect of a fascine mattress, 60 metres wide instead of 35 metres, as in Fig. 43.

IV—Remedial and Strengthening Works on the First Arm and Reconstruction of the Second Arm

1. Strengthening Works on First Arm.

Examination made after the storm of 3rd February, 1934, and the results of experiments on reduced scale models having shown that the violence of storms in the Port of Algiers was such as to threaten undermining by scour, even at the first arm of the Mustapha Jetty, although the less exposed, it was decided to protect the foundation of this part of the work against this grave danger.

It did not seem necessary to go further, because:—

For one thing, this structure, being attacked obliquely, had not suffered at all.

For another thing, this first part of the jetty must eventually be enclosed in the outer harbour: it will then be completely protected by the extension of the North Jetty: in this situation the relatively small space occupied by a vertical-faced wall is an enormous advantage.

It therefore seemed sufficient, since the configuration of the coast did not permit of a direct frontal attack by the sea, to take protective measures designed to increase safety for the duration of the North Jetty extension works, which would only occupy a few years.

This protection took the form of a mattress of fascines, each measuring 30 by 40 metres, arranged as stretchers along the central portion of the jetty and as headers at the extremities, where the slopes give rise to fear of disturbance by eddies. These fascines were weighted with 4 tons per sq. metre of material, " the run of the quarry," including about 40 per cent. of large stones weighing over 100 kilos or 2 cwt.

Being placed with their inner margin at about 25 metres from the wall, an addition to the rubble slope 3 metres in thickness measured horizontally, served to cover the joint and prevent the fascines from becoming exposed by the under-tow of the waves.

As previously stated, the fascine aprons, by preventing the gradual penetration of materials into the sea-bed, allowed these to be of such a size that the bottom velocities, even in the severest storms, could not displace them. Further, they enabled the thickness of the protecting revetment to be reduced, thus increasing the depth of water over it, and consequently reducing the tendency of waves to break, which it must be admitted, as found in February, 1934, is not in any case greatly to be feared in depths of 20 metres.

The bottom is covered in this way for a minimum length of about 50 to 60 metres, which appears to be sufficient, judging by the result of experiments on the scale models.

The fascines employed were made up of three layers of " fagots " or branches, superimposed and crossing at right angles. These three layers were clamped between two grillages, upper and lower, formed of poles, a strong mat of hurdling being attached to the upper grillage. They were made of osiers brought from Holland, no local material being found suitable for making mattresses of such large dimensions.

2. Rebuilding the Second Arm.

The remains of the ruined jetty being in the way, precluded all possibility of rebuilding to the original design, even in modified form.

In addition, there were other reasons for not continuing the adoption of vertical-faced breakwaters at Algiers.

(a) Taken altogether, the improvements dictated by experience and the requirements of safety, would have occasioned a considerable increase in the price per lineal metre. This may be estimated, as below, according to a type section shown in Fig. 47, which takes into account the modifications found necessary and which was investigated for the purpose of comparison.

Base of reinforced concrete	14,000 francs.
Enlargement of lowest course of blocks and improvement of the concrete mix as necessitated by the increase in height of the upper courses	3,500 francs.
Additional reinforcement and filling of horizontal joints	6 000 francs.
Stopping of vertical joints	6,000 francs.
Protective aprons	13,000 francs.

The cost of the work, therefore, excluding any allowance for the enormous expense of clearing away the debris—if indeed it were possible to clear it away—would have reached 98,500

Port of Algiers

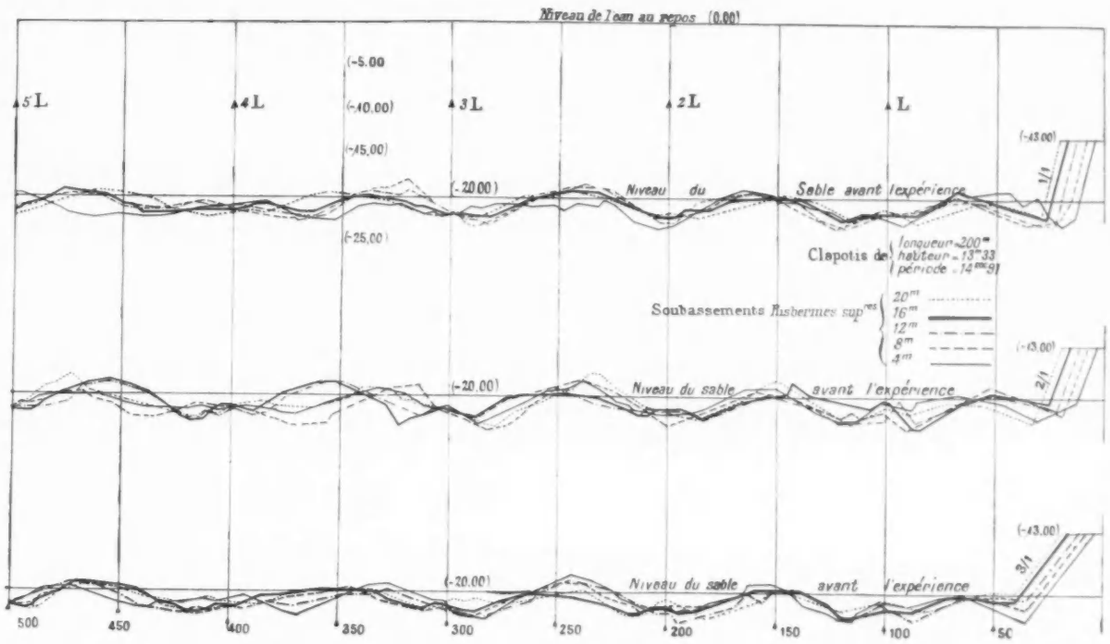


Fig. 42b. Experiments in Sand Erosion, effected in the 1/50th scale model in the Port Laboratory, Algiers. Comparative graphs showing the formation of ridges and furrows, with different widths of berm, at equal depths. There is accretion at the $\frac{1}{4}$ and $\frac{3}{4}$ wave-lengths. There is hollowing at the foot of the slope and at multiples of the half wave-length.

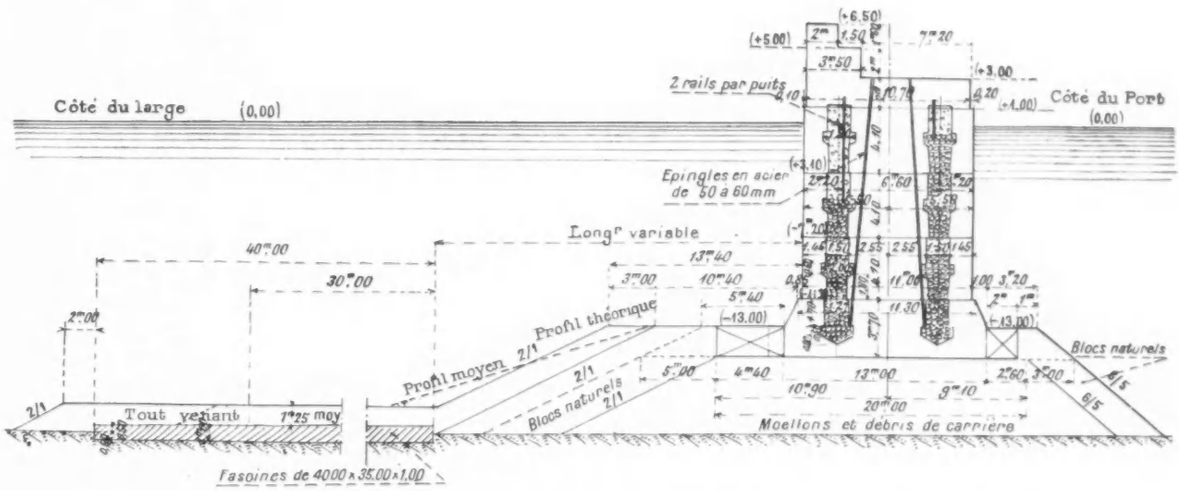


Fig. 46. Cross Section of Mustapha Jetty. Arrangement adopted for protection of bottom by fascines.

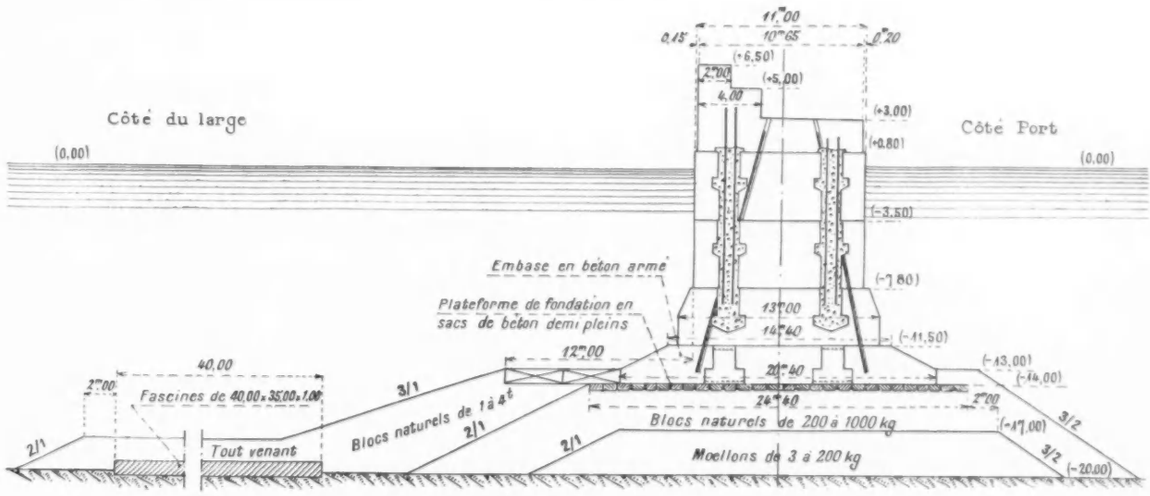


Fig 47. Cross Section. Typical profile of new project for a vertical wall.

Port of Algiers—continued

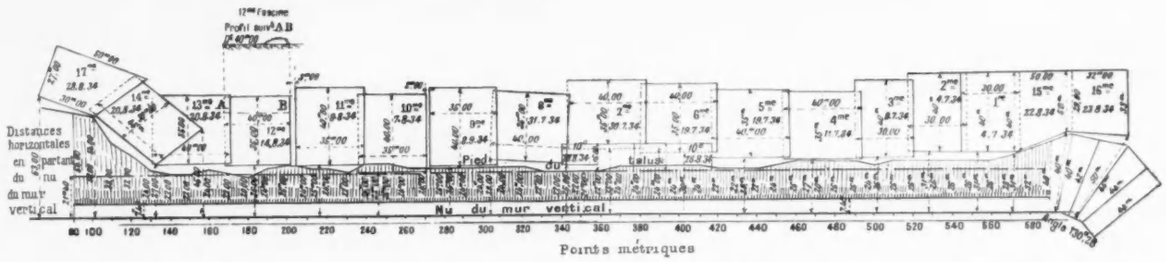


Fig. 45. Plan showing arrangement of fascine mattresses, protecting the bottom in front of the First Arm of the Mustapha Jetty, before the outer revetment was recoated.

francs per lineal metre, as compared with 56,000 francs per metre, representing an increase of 75 per cent. over the cost of the original work.

(b) The breakwater lies exposed to frontal attack of heavy rollers from the open sea and directly protects a basin. Its collapse, therefore—a contingency that cannot be ignored—would be an almost irremediable disaster; on the other hand, experience of the storms of December, 1930, and of December, 1931, during which the Agha Jetty—of the rubble mound type—was seriously damaged, showed that in practice a few days sufficed to establish—behind such a work—a sufficient shelter. Rubble mound breakwaters are never more than broken down for a depth of a few metres, and to remedy this condition artificial 50-ton blocks can be rapidly placed or tipped into the breaches.

It was therefore decided to rebuild on the sloping rubble mound principle. Fig. 48 shows the section adopted.

This is, in fact, no more than a variation of the profile of the Agha Jetty, considerably strengthened, the width having been increased by about 50 per cent., as may be seen by inspection of the figure.

The great advantage of this type is, in fact, that it forms a screen against the penetration of the swell into the harbour. The passage of the swell through the great cavities between artificial blocks is one of the main causes of ranging within enclosed basins. It has been possible to give protection at Algiers, where the ranging has greatly diminished in the Old Harbour in consequence of the construction of the Coal Wharf adjoining the East breakwater and following on the re-coating of the inner face of the old North breakwater.

If the use of pell-mell blocks is permissible for an outer basin, it is important not to overlook the fact that, for protection of inner basins, means must be found to render the mass resistant by density to the passage of the swell.

The possibility of utilising very large blocks of 400 tons weight, of the type formerly used for the Mustapha Jetty, has permitted the formation of a screen of particularly effective character, and one which will greatly contribute to the resistance of the whole structure.

The blocks protecting the slope are not laid in level courses but at random, in order to facilitate the renewals which always become necessary through gradual settlement of the mound, a well-known trouble experienced with early breakwaters, but largely compensated by their safety and easy repair.

The arrises and corners of random or " pell-mell " blocks, moreover, furnish irregularities which dissipate the energy of waves and, by checking their tendency to rise over the parapets, reduce the risk of disturbance to the sheltered water within.

All the same, for reasons of economy, the work is only to be rebuilt to the full designed section for a length of 200 metres, between points 800 and 1,000.

For the remainder of the length, where its function is now really to protect the passage, the work will be of wave-breaker blocks brought up to the level of zero for 50 metres, to —3 m. for a further 50 m. and extended as a submerged spur for the last 100 m., thus following an arrangement already adopted for the main jetty at Casablanca, and which possesses, among other advantages—besides its economy—that of reducing the tendency of the swell to swing round the end of the breakwater as a pivot.

The old breakwater roundhead, which was completely overturned in the storm, has been demolished by exploding a charge of 3 tons of dynamite. This was placed in a lewis hole of one of the base blocks of the roundhead which, being in the widened portion, was not concreted in the course of construction. The blasting of this charge made clearance in one operation to a depth of —12 m. at the site of the old roundhead. (See Fig. 49).

V—Conclusions

The facts observed and measurements taken, both in the laboratory on scale models and on full-size works at Algiers, lead irresistibly by reason of their consistency to certain conclusions:—

(1) Methods of calculation derived by hydro-dynamic theory from the phenomena of the standing wave or clapotis against vertical-faced walls, do serve to evaluate with sufficient accuracy the forces that walls of this type have to bear, on condition that the violence of the storms to be borne is not under-estimated.

In this connection, it must not be overlooked that the amplitude of the swell in the course of a single storm, far from being uniform, is liable both to periodical increase and to localised excess, and that it is prudent to allow for these factors by an increase of 50 per cent. in the amplitude assumed in calculation.

The length of wave to be taken into account ought to be determined by the theoretical formulæ based on the time interval observed in severe storms, since this interval (which is a sort of constant), is much easier to observe accurately than the actual wave-length itself; moreover, any error in estimation of wave-length does not very greatly influence the amount of the calculated forces.

2.—Calculations should be made for determination of the following:—

(a) The ratio between the overturning moment and the moment of stability and, in the case of works whose sections

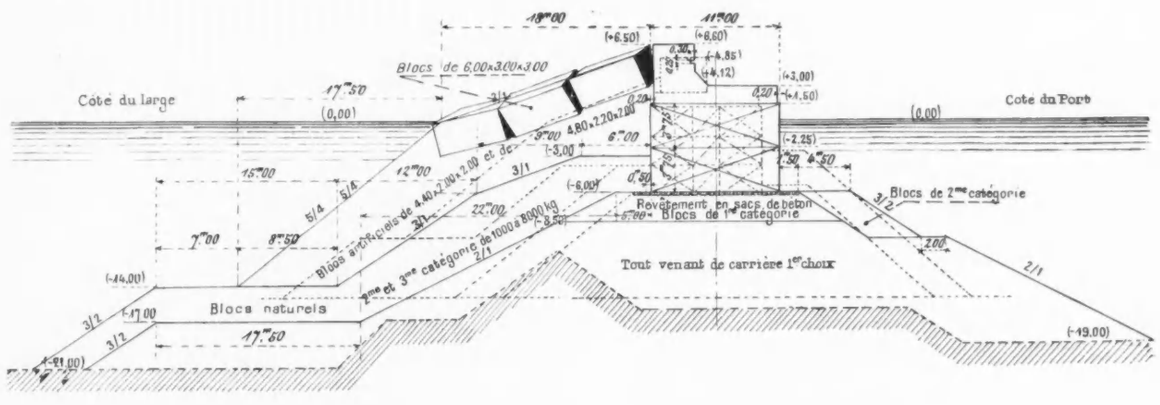

Côté du large
Côté du Port
Blocs de 6,00x3,00x3,00
Blocs de 4,80x2,20x2,00
Blocs principaux de 4,40x2,00x2,00 et de 1000 à 8000 kg
Revêtement en sacs de béton
Blocs de 1re catégorie
Blocs de 2me catégorie
Tout venant de carrière 1er choix
2me et 3me catégorie de 1000 à 8000 kg
Blocs naturels

Fig. 48. Cross Section. Typical profile of the projected reconstruction of the Second Arm of the Mustapha Jetty, between metrage points 800 and 1,000. (The dotted line shows the profile of the old Agha Jetty).

Port of Algiers—*continued*

are not monolithic, the ratio of horizontal forces to the resistance to sliding and shear.

It does not seem prudent, because of the prevailing uncertainty as to the magnitude of storm to be reckoned with, to undertake the construction of works in which these ratios exceed 1 : 2, notwithstanding the increase recommended in the assumed amplitude of wave.

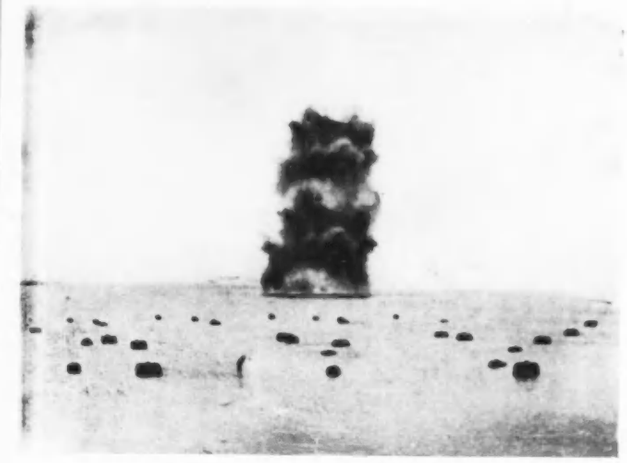


Fig. 49. Demolition of the roundhead of the Mustapha Jetty, at metrage point 1,000 by means of a charge of 3 tons of dynamite.

A factor of safety of 2 seems to be properly a minimum for works which have to bear forces whose measurement is very difficult, involving the large degree of the unknown that appertains to all natural phenomena, and the failure of which would entail the gravest consequences, affecting the working of the ports that they are designed to protect.

(b) The pressure upon the rubble base.

A maximum value cannot be assigned to this pressure except as a function of the strength of the material and the form of the substructure.

It seems advisable, however, not to exceed a pressure of 5 kilograms per sq. cm. (5 tons per sq. ft.) and this calls for the use of large base blocks so arranged as to avoid disturbance during the recoil of the waves and to protect the berm of the rubble foundation mound.

In any case of works exposed to heavy storms, the materials of the base in proximity to the bearing surface should be composed of hard stone of sufficiently large gauge, while the levelling of the bearing surface can in suitable conditions be effected by means of sacks half-filled with concrete deposited before setting.

3. Harbour breakwaters are not often founded on rocky bottoms, but rather, owing to their position near the coast, the bottoms on which they rest are usually formed of fine material of detrital origin. It should not be overlooked, when deciding upon the type of construction to be adopted, that vertical-faced structures are, by reason of their form, particularly liable to the danger of undermining, this danger being increased by the recoil of the waves at the toe of the wall and by the high velocity of the particles of water near the bottom.

The security of foundations, being a prime element in the durability of works, should be assured not only by an adequate projection of the forward part of the base, but also by a protective revetment of the bottom, which can readily be effected by fascine mats, weighted and covered by a blanketing of stone.

4. Experience does not appear to confirm many of the advantages which have been supposed to appertain to vertical works. The improvements whose utility and even necessity have been recognised in practice, reduce to a very large extent the economy of the type, bearing in mind that any estimation of price should include the high cost of lifting machinery, for works in cyclopean block work, and of dry-docks for walls formed of caissons.

The speed of construction cannot be regarded as superior to that of sloping mounds, because of the impossibility of carrying on the deposition of blocks or the placing of caissons if the sea is not absolutely calm.

The only two advantages which remain definitely to the credit of vertical works are:—

On the one hand, the small cubic volume of material required, which is a point of value in places where there are no large quarries within easy reach.

On the other hand, the small space occupied and the possibilty of vessels mooring directly alongside.

5. In any case, it does not appear advisable to resort to protective works of vertical type, either—

(a) in very exposed ports where deep water is found near the coast and where the "fetch" is considerable in the dangerous quarter, or

(b) in ports where long experience has not yet furnished ground for a sufficiently accurate forecast of the violence of the severest storms, as is often the case in colonial ports, where, moreover, the provision and transport of powerful cranes for handling cyclopean blocks would give rise to heavy plant-charges and to grave risks of mishap.

The Port of Copenhagen.

The number of ships which entered the Port of Copenhagen during February, 1936, were as follows:—From inland ports, 773 steam and motor-ships of 149,855 n.r.t. and 20 sailing vessels arrived of 4,286 n.r.t. Shipping arriving from foreign ports amounted to 640 steam and motor-ships of 364,668 n.r.t. and 6 sailing vessels of 980 n.r.t. The total of steam and motor-ships and sailing vessels arriving from both inland and foreign ports for February, 1936, amounted to 1,439 vessels of 519,789 n.r.t.

Seaborne Goods Traffic of the Weser Ports during February.

Goods turnover of the Lower Weser ports during February, 1936, at 686,493 tons was lower than that of January, 1936, when it amounted to 726,995 tons. However, if it is taken into consideration that there were two more days in January, it may be seen that February showed a slight increase. In February 23,672 tons were transhipped, etc., per day, compared with 23,452 tons in January. Goods receipts fell from 287,355 tons (9,270 tons per diem) in January to 246,060 tons (8,485 tons per diem) in February, whereas goods despatched during the same period rose from 429,640 tons (14,182 tons per diem) to 440,433 tons (15,187 tons per diem). Compared with February, 1935, volume of goods of the Lower Weser ports during February, 1936, was 2,022 tons lower; however, goods despatched were 51,397 tons higher.

Total seaborne goods traffic of the Bremen ports in February, 1936, at 561,431 tons, was 21,514 tons lower than that of the previous month. But when the number of days is taken into consideration an actual stimulation of traffic may be seen from 18,805 tons in January to 19,360 tons per diem in February, 1936. Goods imported in Bremen ports during this period fell from 240,090 tons (7,745 tons per diem) to 213,456 tons (7,361 tons per diem), while goods exported rose from 342,855 tons (11,060 tons per diem) to 347,975 tons (11,999 tons per diem) in February, 1936. Imports in February, 1936, were 4,275 tons less than in 1935, exports 33,222 tons more.

Decrease in imports was chiefly due to smaller arrivals of frozen meat, oats, tobacco, ores, mineral oils, manures and cotton. Imports of rye, southern fruits, coals, wool and metals, on the other hand, increased.

The increase in exports of the Bremen ports was chiefly due to expansion of the exportation of finished manufactures, of which there were increases in nearly all branches. On the other hand despatch of certain raw materials, such as fodders, coke and manures was considerably lower than in the previous month. Rather more rice, fats and oils, as well as products of the mills and rock salt, were shipped than in January, 1936.

Robert Boby, Ltd.

A New Catalogue M.H. 4 has recently been published by Robert Boby, Ltd., of Bury St. Edmunds. The catalogue comprises 32 pages of illustrations, showing the various types of plants supplied by this firm, amongst which are coal and coke handling plant, coke screening and grading plant, conveyors of all types, including pneumatic and portable conveyors, steel constructional work, vacuum pumps, etc. The catalogue is very well produced, and certainly serves to show the wide range of activities which are carried out by Robert Boby, Ltd.

Dutch Shipbuilding.

Messrs. L. Smit & Zoon, Kinderdijk, Holland, launched on April 23rd, the twin-screw motor cargo and passenger vessel "De Zeeuw" for navigation on the Rhine. The main dimensions are 57 metres by 7 metres by 2.75 metres. She is equipped with two Deutz Diesel motors of 300/360 h.p. each, which will give a speed of 23 kilometres per hour. The vessel has been built to the order of Messrs. Nederlandsche Stoomboot Reederij, of Rotterdam.

North-East Coast Notes

Meeting of Tyne Improvement Commission.

Sir Frank Simpson referred at the March meeting of the Tyne Improvement Commission to the Tyne-Tees Shipping Company's extension of the quay at Gateshead to the Swing Bridge by 220 ft. When the present work is completed the quay will have a total length of about 1,000 ft. The quay is being extended by Messrs. Brims and Co., Ltd., of Newcastle. The extension will fill the gap between the Hillgate Quay, now used by the Tyne-Tees Company and the Gateshead end of the Swing Bridge. The work, including the quay, a transit shed, and a road, will cost about £14,000. The river opposite the extension is to be dredged to a depth of 18 ft. at low water, making it uniform with Hillgate Quay. The whole scheme will be completed in about six months.

Conncillor R. S. Dalgliesh alluded also to the progress of the new coaling staiths for Messrs. Bowes and Partners at Jarrow, and said two of the three units would be ready for use this month (May), and the third in July.

Northern Coal Trade Figures.

An increase of coal and coke shipments in the two months of this year compared with the corresponding period of 1935 was indicated in statistics presented at the March meeting of the Tyne Improvement Commission in Newcastle. The quantity of coal and coke shipped in January and February was 2,262,949 tons compared with 2,258,065 tons last year. The report states that shipments to Italy have practically ceased for the time being. Belgium and France took much less than last year, but there was an increase of nearly 50,000 tons to the West Indies and substantial increases to Algeria, Holland and Scandinavia.

At the March meeting of the Blyth Harbour Commission, Mr. R. M. Sutton, the chairman, submitted particulars of the coal shipments for the two months ended February, with comparative figures for 1935 and 1929, as follows:—1936, 1,163,044 tons; 1935, 1,057,220 tons; and 1929, 856,368 tons. These totals show an increase of 10 per cent. on 1935 and 36 per cent. on 1929. With a view to bringing the discharging facilities in the South Harbour more up-to-date a recommendation was adopted to provide a new 3-ton electric crane of the luffing jib type.

A welcome increase in the shipments from the Wear is shown in the figures for the first two months of the year, the total being 696,768 tons for 1936, compared with 677,546 tons for 1935. Imports also were up, being 43,128 tons for 1936, against 36,329 tons in 1935.

Coal and coke shipments from the Hartlepools for the three months of this year were 899,785 tons, an increase of 56,320 tons or 6.68 per cent. compared with the first three months of 1935. Timber imports for the Hartlepools in the past three months were 20,791 loads, compared with 22,646 loads in the corresponding period of 1935, a decrease of 8.2 per cent.

Tyne Dues Problem.

An effort to get a reduction of dues charged on goods landed on to Newcastle Corporation quays was inaugurated at the end of March when Councillor R. S. Dalgliesh presided over a meeting of Quayside shipping agents in Newcastle. The meeting was private, but at its conclusion Councillor Dalgliesh made a statement. He said: "The position in reference to charges and to the growing practice of discharging cargoes overside into lighters has been thoroughly ventilated. It has been emphasised that if the charges to the receivers of goods are reduced—and there is room for reduction—the incentive to the practice of discharging overside will be reduced. This practice is unfair to the Corporation as owners of the quays and berths which have been costly to construct. A further meeting is to be held in the near future and I am hopeful that means will be found of getting the charges down.

It may be explained that no package dues are payable on goods discharged overside into lighters, even though the discharging vessel is occupying a berth alongside the Corporation Quay. Ald. Lee, chairman of the Newcastle Corporation Trade and Commerce Committee, recently cited an instance in which a ship occupying an expensive berth, discharged 35 tons of cargo on to the quay and 1,300 tons into lighters. Package dues were paid only on the 35 tons. Some time ago a proposed Parliamentary Bill which would have given the Corporation the right to charge dues on goods unloaded into lighters, was negatived.

The Port of Amsterdam

The position of the Port of Amsterdam in regard to number of vessels and tonnage, and to goods traffic arrived and sailed, as compared with the corresponding figures of last year, is as follows:—

SEAGOING VESSELS AND TONNAGE.

	ARRIVALS				SAILINGS			
	No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent
Mar. 1935 ...	261		389,097		262		383,958	
,, 1936 ...	259		380,302		247		373,706	
	−2	−0·77	−8,795	−2·26	−15	−5·73	−10·252	−2·67
Feb. 1936 ...	227		331,537		244		343,648	
Mar. 1936 ...	259		380,302		247		373,706	
	+32	+14·1	+48,765	+14·71	+3	+1·23	+30,058	+8·75
Jan.-Mar. 1935 ...	739		1,153,112		743		1,148,868	
,, 1936 ...	730		1,075,211		732		1,066,016	
	−9	−1·22	−77,901	−6·76	−11	−1·48	−82,852	−7·21

SEAGOING GOODS TRAFFIC.
(In Tons of 1000 Kilos*).

	1 Import	2 Transit incl. in col. 1	3 Export	4 Transit incl. in col. 3	5 Total col. 1 & 3
Feb. 1935	292,923	62,436	137,709	56,711	430,632
,, 1936	245,935	46,023	137,891	61,450	383,826
	−46,988	−16,413	+182	+4,739	−46,806
	−16·04%	−26·29%	+0·13%	+8·36%	−10·87%
Jan. 1936	261,574	67,426	169,126	61,788	430,700
Feb. 1936	245,935	46,023	137,891	61,450	383,82
	−15,639	−21,403	−31,235	−333	−46,874
	−5·98%	−31·74%	−18·47%	−0·54%	−10·88%
Jan.-Feb. 1935 ...	592,245	136,724	299,264	126,024	891,509
,, 1936 ...	507,509	113,449	307,017	123,233	814,526
	−84,736	−23,275	+7,753	−2,791	−76,983
	−14·38%	−17·02%	+2·59%	−2·21%	−8·64%

* These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

Classified according to flag, the number of vessels which entered the Port of Amsterdam during March, 1936, was:—Netherlands, 133; Great Britain, 53; German, 20; Swedish, 19; Norwegian, 14; Danish, 8; French, 3; Greek, 5; Lettish, 2; Dantzic, 1; Lithuanian, 1.

Vessels laid-up at Amsterdam:—1st March, 1936—8 vessels, measuring 53,565 tons gross; 1st April, 1935—15 vessels, measuring 109,022 tons gross; 1st April, 1936—8 vessels, measuring 51,602 tons gross.

Partnership.

Messrs. Coode, Wilson, Mitchell & Vaughan-Lee, Chartered Civil Engineers, 9, Victoria Street, London, S.W.1, have taken into partnership Mr. R. D. Gwyther, who has been on their staff in charge of works for a number of years.

The Port of Rotterdam.

The Chamber of Commerce and Industry of Rotterdam has recently issued the statistics concerning the movemert of seagoing ships in the New Waterway, and which are as follows: During March, 1936, 971 ships with a net registered tonnage of 1,554,733 entered the Port of Rotterdam, as compared with 934 ships of 1,526,934 n.r.t. during March, 1935. The number of ships entering for the small ports in the environs were 212 of 471,120 n.r.t., as compared with 233 ships of 446,852 n.r.t. in March, 1935.

For the first quarter of the year, January to March, 1936, 2,919 ships of 4,900,005 n.r.t. entered the Port of Rotterdam, as compared with 2,694 ships of 4,313,229 n.r.t. in the corresponding period of 1935. The number of ships entering for the small ports in the environs of Rotterdam during the first quarter of 1936 were 593 ships of 1,293,671 n.r.t., as compared with 588 ships of 1,135,411 n.r.t. in the corresponding period of 1935.

After deducting the number of ships counted more than once in the different ports, the number of entrances in the month of March, 1936, amounted to 1,099 vessels of 1,792,802 n.r.t., as compared with 1,088 vessels of 1,785,221 n.r.t. in March, 1935. For the first quarter of 1936, the total entrances were 3,289 vessels of 5,552,379 n.r.t., as compared with 3,107 vessels of 5,019,784 n.r.t. in the corresponding period of 1935. These figures are for the whole region of the Port of Rotterdam with its environs, comprising the delta formed by the mouths of the Rivers Rhine and Meuse.

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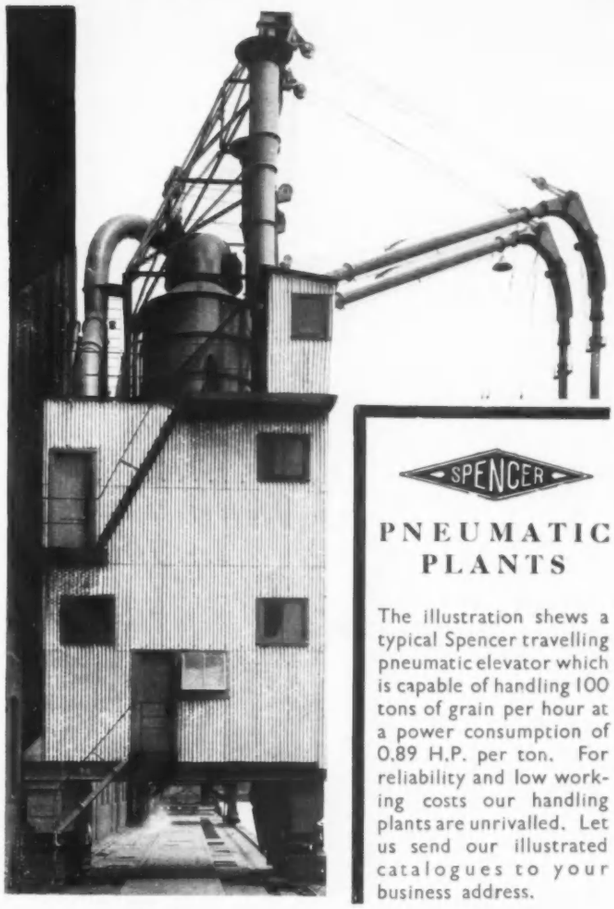

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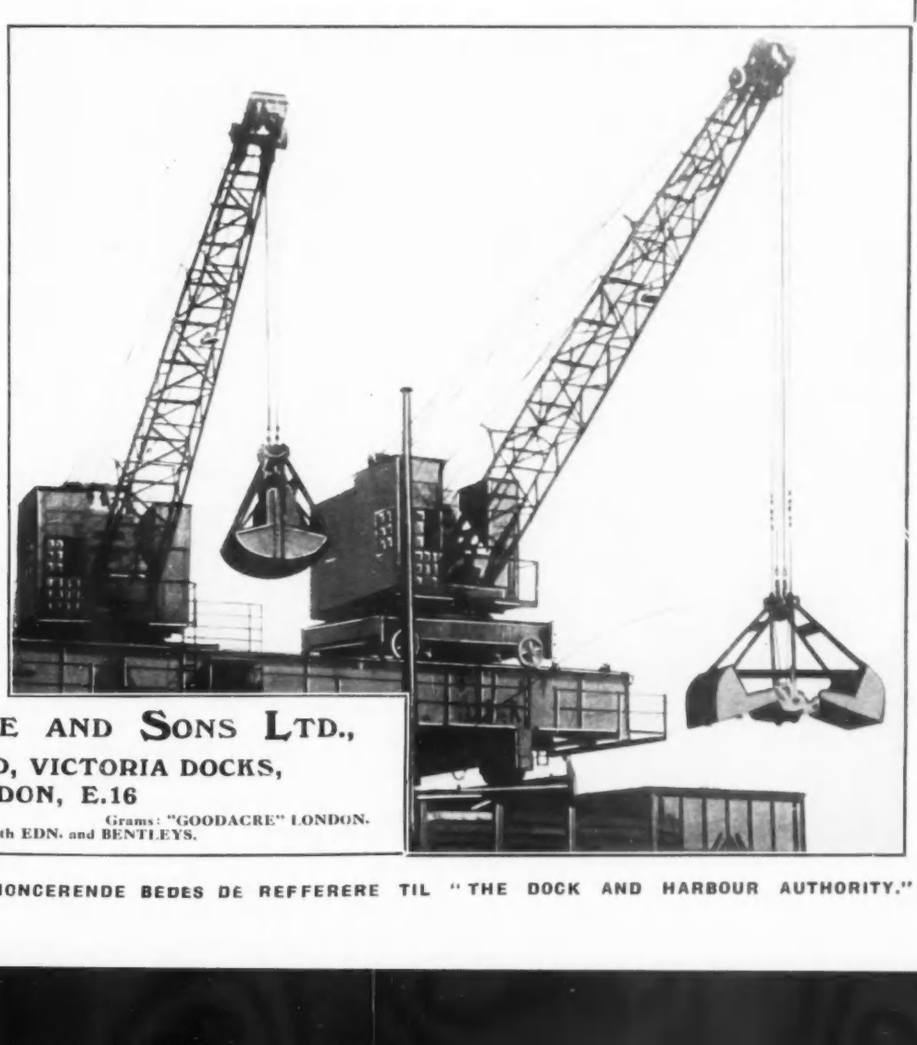

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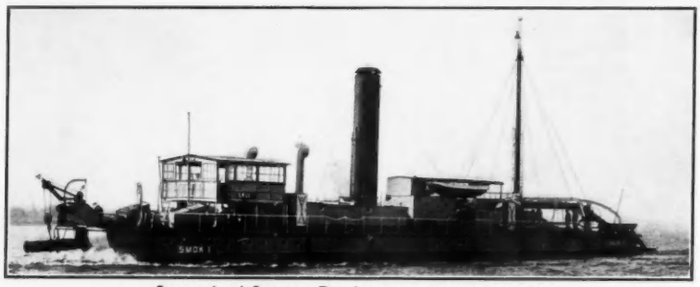

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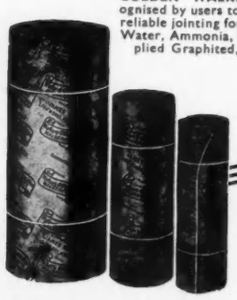

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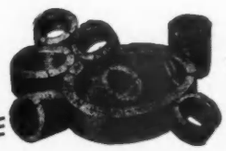

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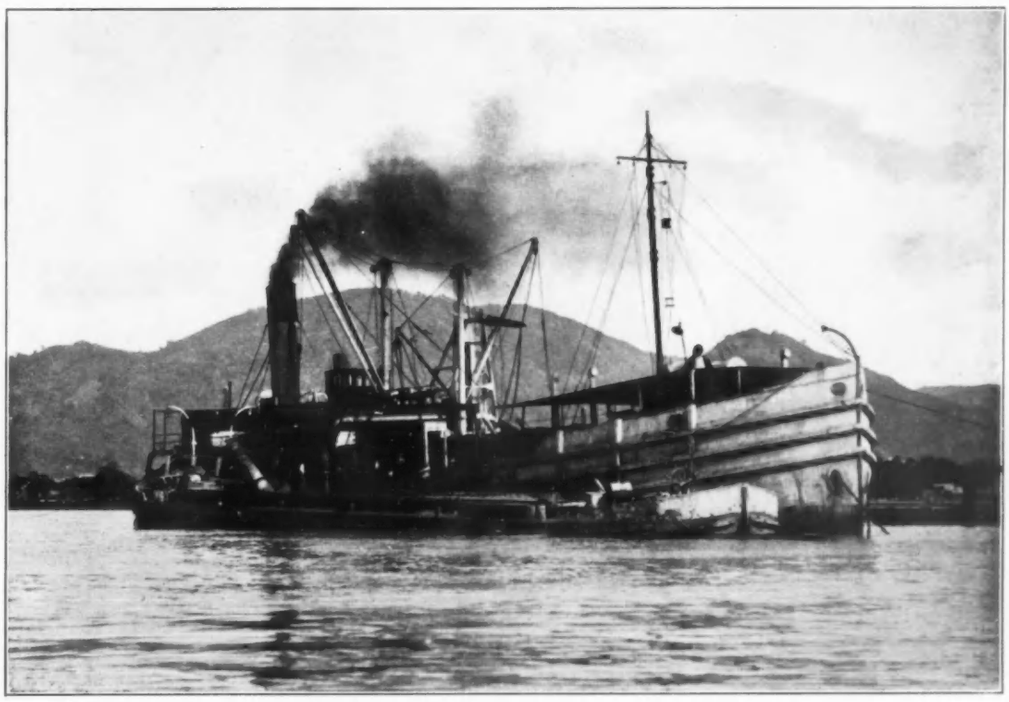

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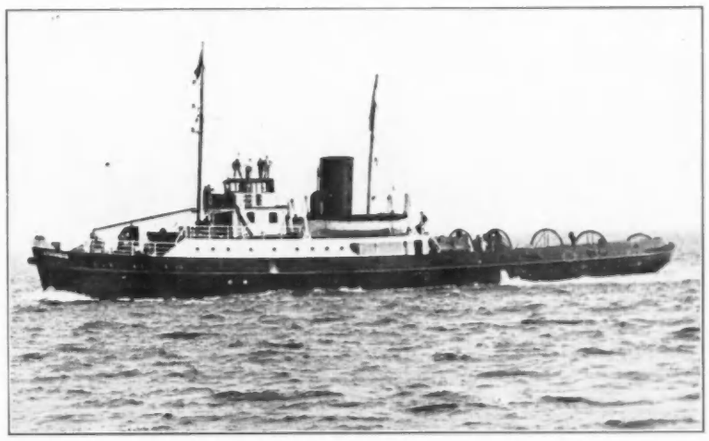

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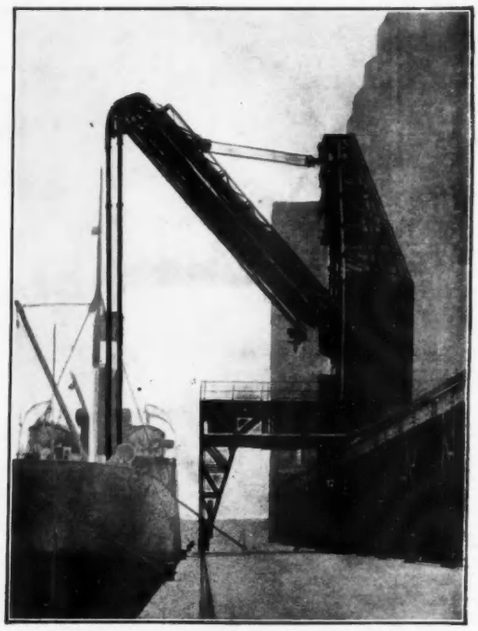

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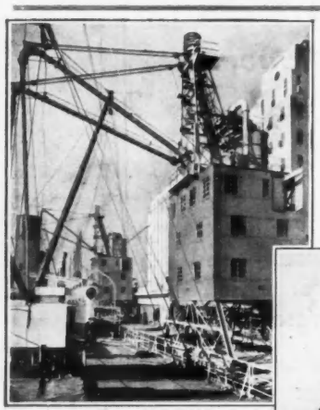

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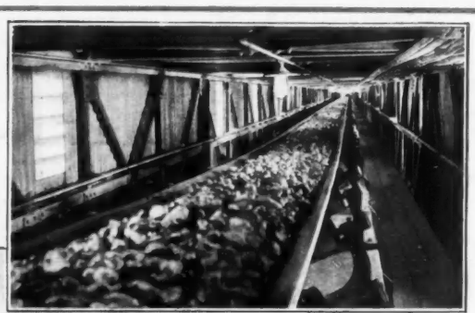

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